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THE RESULTS OF TREATMENT AND THE OPTICAL CORRECTION OF AMETROPIA IN ARRESTING THE INCREASE OF MYOPIA. A CLINICAL AND STATISTICAL STUDY.[1]

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MODERN ophthalmology has opened no more interesting or important field for investigation than is presented in the etiology and history of the myopic eye. An important step in advance was taken when it came to be recognized as a diseased eye. The general acceptance of this view has placed the prevention of near sight at the basis of all modern investigation in the hygiene of the school room. Numerous observers, both in Europe and America, had by extensive statistics demonstrated the rapid rise in the percentage of near sight as the pupils advanced in the educational process, and very properly fastened the responsibility for the increase upon the protracted strain upon the eyes in working at a near point, as in reading and writing. Important reforms were introduced in the architecture of the school buildings in order to secure sufficient and properly directed light, and great improvements were made in the furniture of the school-room, type used in the text-books, etc., but notwithstanding these extensive and sadly needed reforms, repeated examinations of the same eyes, before and after these laudable efforts in school hygiene,

[1] Read in the abstract before the American Ophthalmological Society, Washington, D. C., May 30, 1894.

discovered no diminution, in either the percentage or grade of the myopia. It became obvious, therefore, that some factor other than the faulty methods of the schools was operative in the production of the pathological processes underlying myopia.

It was probable that this would be found in some peculiarity in the structure or tendencies of those eyes which developed near sight. With this thought in mind, I secured the aid of a corps of skilled assistants, and carefully examined large numbers of eyes in the various grades of the public schools of Philadelphia. The findings were presented to the Philadelphia County Medical Society in April, 1881, and were subsequently published with full details in the Transactions of the Pennsylvania State Medical Society for the same year. The findings of all other observers as to the steady rise in the percentage of myopia were verified by this work, but in addition to this well known fact it was sought to discover the relation of asthenopia, lowered sharpness of vision, and intraocular pathological states to the various forms of ametropia. To this end not only was the sharpness of vision and range of accommodation, etc., for each eye carefully determined, but a painstaking ophthalmoscopic study made of each and every eye in the entire series.

This was undertaken in the belief that the source of the myopic eye would be found in the group of eyes presenting the incipient pathological conditions which at a later or more advanced stage in their history were generally recognized as characteristic of the near-sighted eye. The logical conclusions flowing from the resulting figures were of great interest. As in the findings of other observers, the emmetropic eye maintained a nearly uniform percentage through all the classes, from the lowest to the highest, but, a fact of equal or more importance was that the emmetropic eye, or those eyes which most nearly approached this ideal state of refraction, enjoyed the highest acuity of vision, were comparatively free from pain or trouble of any kind, and certainly bore the strain imposed by the schools with a minimum of peril. On the other hand, the pupils who

entered upon their school life with congenital anomalies of refraction, were those who were found to suffer from asthenopia, and their eyes, particularly where astigmatism or anisometropia were present, presented those intraocular pathological changes, varying in degree but not in kind, which unquestionably related them to the myopic eye. The reader is referred to the original publication for a study of the complete tables of statistics, and also to a paper on School Hygiene, now in press, for "A System of Diseases of the Eye," by Dr. W. F. Norris and C. A. Oliver, where a full study is made of its relations to the hygiene of the eye.

The present study is in some respects a continuation of the work begun in the schools in 1878, and may fairly be regarded as furnishing a demonstration of the correctness of the deductions then made. If it were true that asthenopia and the attending intraocular disease depended upon the congenital anomalies in the form of the eye-ball, as the statistics certainly taught, then it was fair to conclude that the optical correction of these anomalies would be helpful in arresting the resulting injury. In the following pages will be found the results of a brief analysis of approximately 200,000 eyes receiving treatment and glasses for the optical correction of ametropia. The work was undertaken as a part of the paper on school hygiene noticed above. First of all a complete analysis was made of all the cases of myopia treated in private practice since January 1, 1874. With rare exceptions they were corrected under the more or less prolonged use of a mydriatic, and for the most part also with the administration of alteratives addressed to the choroidal inflammation. There was a possibility of error in the conclusions reached, since the patients were drawn from the more successful and studious portions of the community, and might therefore present a higher percentage of myopia to other forms of ametropia than would be shown by the community at large or by the hospital statistics. Therefore, in order to avoid misleading conclusions from this cause, and to secure the advantage of larger numbers, I gained access to the prescription books of Queen and Company and the Fox Optical Company, and culled from them all the

prescriptions given by ophthalmic surgeons for the correction of errors of refraction. Glasses ordered for the correction of presbyopia were excluded, and only those ordered for distant vision were taken. In this laborious undertaking I was greatly aided by the skilled work of my friends and assistants, Dr. John T. Carpenter, Jr., and Dr. James Thorington. Without such aid the work would have been impossible.

During the twenty years covered by the statistics, it has been the almost uniform custom of ophthalmic surgeons in Philadelphia to correct by glasses all errors of refraction found in asthenopic patients, both in private and hospital practice. In the analysis of my own books only those cases which were corrected under the employment of mydriatics are included. In the opticians' books it was not possible to determine whether a mydriatic had been employed or not, but doubtless many of the glasses ordered represented only manifest corrections.

It seemed reasonable to expect that, if the causative relation between congenital anomalies of refraction and myopia were true as claimed in the deductions from the school statistics, the uniform correction of these anomalies in the community for all asthenopic eyes, or even for any considerable percentage of them, would during or after twenty years reveal the beneficial results of such correction in a reduction, both of the percentage of myopic eyes applying for treatment and also in the grade of myopia found. It is true that certain possible fallacies present themselves in such a study; *e.g.*, it may be urged that in the first years covered by the investigation the accumulated myopia of former years would enter to swell the number of myopic eyes, and that in the later years a relatively larger number of hypermetropic eyes would present themselves for treatment as the value of correcting glasses in relieving headache became more widely recognized by physicians and the laity. But this is amply offset in all probability by the greater frequency with which in later years the myopic patients consult the surgeon for correction of their myopia, while in the first years they simply applied to the optician and chose the glasses which gave them clear distant vision.

Barring possible errors of this class the resulting tables, and the percentage curves constructed from them, are both interesting and instructive, not only as showing the analysis of refraction errors in a large number of eyes, but as substantially demonstrating the essential responsibility of congenital anomalies of refraction in the etiology of near sight, and also the value of treatment and correction of these eyes in arresting the increase of myopia.

As the design was to ascertain the percentage of M. and M. As. in the several years, the eyes with hypermetropic refraction were simply counted in order to show the percentage of the former to the whole number receiving correcting glasses.

The degree of M. was carefully recorded from M. = .50 D. to the highest grades and were grouped as follows: 1. D. or less; 1. D. to 3. D.; 3. D. to 7. D.; 7. D. to 10. D. and 10. D. or higher. These various grades were grouped for the years included in the study as follows: 1874 to 1880 inclusive; 1881 to 1883; 1884 to 1886; 1887 to 1889; 1890 to 1893. The whole number of eyes for which distance glasses had been furnished by the optical companies was 187,018, of which 21.6 % were for myopic refraction. Of these latter, as shown by the glasses ordered, 39.5 % were for simple M. and 60.5 % for myopic astigmatism. In the private case books 8736 had received careful mydriatic corrections, the drug having been pressed to paralysis of the accommodation. Of these 1925, or 22 % were myopic. Of the myopic eyes 9.67 % showed only simple M., while 90.33 % were astigmatic in varying degrees, but only those received cylindrical glasses whose vision was distinctly improved by the addition of the cylinder to the spherical glass, where a compound glass was required, and only such cases appear in the tables. The striking difference in the percentage of astigmatism in the case books and the opticians' books is accounted for, in part, by the fact that in the private work the corrections were made with full paralysis of the accommodation, and by the greater care with which the astigmatism was sought for in every case and corrected when present, while it is probable that in the formulæ taken from the

opticians' books, many of them were manifest corrections, and therefore the lower grades were overlooked or possibly neglected as unimportant, especially in the hospital work there included. Then, too, in irritable or inflamed eyes astigmatism is readily lost in manifest corrections. But even in the lower percentage of astigmatism found in the books of the optical companies, the 60.5 % is of much significance as showing the great prevalence of this anomaly and the important role it plays in these distending pathological eyes. The full significance of the figures, however, does not appear except from a careful study of the full refraction tables, and not even then since the large number of patients with anisometropia are not tabulated separately, for the reason that they do not lend themselves readily to any tabulation which will portray successfully their important teaching as to the history of the myopic eye. This can be made clear only by the extensive reports of individual clinical histories. Thus the records show a very large number of patients with a mixed astigmatism on one side, while on the other the eye had already passed through the turn-stile of astigmatism over into simple or compound myopic astigmatism, similar pathological changes being present in both eyes. In others a simple or compound M.As. was found on one side and on the other a tonic cramp of the accommodation simulating myopic refraction, but which nevertheless under the prolonged use of a strong mydriatic gave place to a hypermetrophic astigmatism, it being plainly obvious that longer neglect would have resulted in myopic refraction in this eye also. This history is, however, strongly suggested in Table II, in which is shown the percentage and grade of M. in succeeding periods of years. In columns 5 to 9, and also in the curves constructed from them (Figs. 4 and 5) it is shown that all the higher grades of M. steadily decrease, while the lowest grades in which are included by far the larger number of the cases of mixed and simple astigmatism, as shown in Table I rise in percentage through the later periods of years, as seen in column 9, Table II. This is, however, only relative as there was here also an actual decrease

in numbers. The obvious teaching of the figures is that the progress of the increasing refraction both in percentage of cases and in the degree of the increase was arrested by the treatment and glasses received. The rise in the percentage in column 9 is due to the fact that the low grades of M. were not allowed to pass into the higher grades as they had done in the preceding years, hence a relative increase in their numbers and a corresponding diminution in the number presenting the higher grades of M., a process which was operative in all the intermediate grades. In a word we are here taught by the analysis of a large number of eyes the lesson, so obvious from any careful clinical study of individual cases, that we have first, the asthenopic eye with hypermetropic astigmatism, then the mixed form which, if neglected, passes into the simple myopic, and finally into compound myopic astigmatism and progressive near sight. The percentage of mixed and simple myopic astigmatism as shown by the original tables is instructive in this connection. The comparison of the private case-book records with the formulæ from the opticians' books are also interesting as showing the value of mydriatic corrections in this class of patients. The following table will serve to show in the first place how the mixed and simple forms of astigmatism are confined to the comparatively low grades of M., a fact of much significance in enforcing the claims of this paper:

TABLE I.

Grade of M. in meridian of highest refraction.	Mixed Astigmatism.		Simple Myopic Astigmatism.	
	Case Books.	Opticians' Books.	Case Books.	Opticians' Books.
Less than 1. D.	38.7	21.0	32.6	38.0
1. D. to 3. D.	19.7	11.2	15.1	20.3
3. D. to 7.	4.4	3.2	6.3	7.2
7. D. to 10. D.	0.0	0.0	0.0	0.0
10. D. or higher.	0.0	0.0	0.0	0.0

Table showing the rapid decline in the percentage of eyes with simple myopic and mixed astigmatism in grades of M. higher than 1. D. (In mixed astigmatism the refraction of the myopic meridian was taken as representing the grade of M.)

The marked difference in the per cent. of the mixed form between the case books and the opticians' books is noteworthy, and doubtless shows that without the mydriatic the hypermetropic meridian is overlooked and that the case passes for simple myopic, or possibly even compound myopic astigmatism, a fact I have very many times seen verified in actual practice. It will be seen by the table that in the case books where M. was less than 1.D. there was 38.7% of mixed astigmatism, whereas in the opticians' books there was found but 21.0%. In simple myopic astigmatism on the other hand the reverse obtained, the simple myopic form being higher than in the case books.

TABLE II.

1	2	3	4	5	6	7	8	9
Years.	Myopic Eyes.	Simple Myopia.	Myopic Astigmatism.	M. 10 D. or higher.	M. 7. D. to 10.	M. 3. D. M. 7. D.	M. 1. D. to 3.	M. 1.D. or less.
1874 1880	28.43	15.5	85.5	2.58	2.36	11.77	9.5	2.3
1881 1883	23.05	15.45	84.55	2.10	1.96	6.92	8.6	2.3
1884 1886	22.07	5.75	94.25	1.67	2.90	8.43	7.8	1.9
1887 1889	19.82	6.50	93.50	1.10	1.20	6.79	7.5	2.7
1890 1893	16.78	5.66	94.34	1.37	1.47	5.27	5.5	3.1
Average	22.03	9.67	90.33	1.76	1.98	7.84	7.78	2.46

Table showing by years the steady and rapid decline in the percentage and grade of myopia.

The tables from which the curves representing the optical companies are drawn are omitted since they would have been a mere repetition of Table II. As was anticipated the percentage of myopia is somewhat higher in the private case books, only 3 % however; but it will be observed that the steady decrease in the percentage of near sight, and also

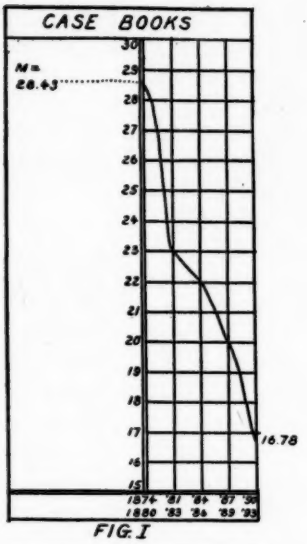

FIG. I

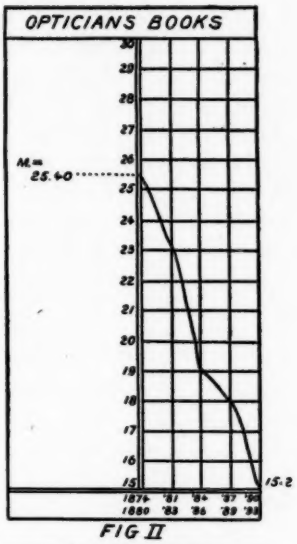

FIG II

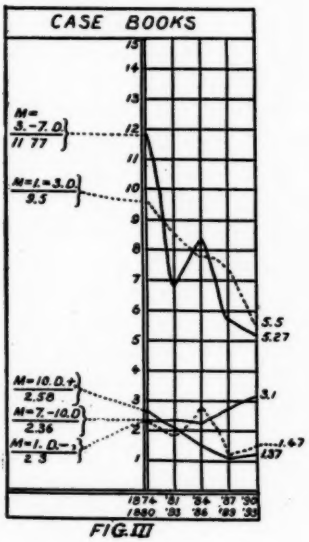

FIG. III

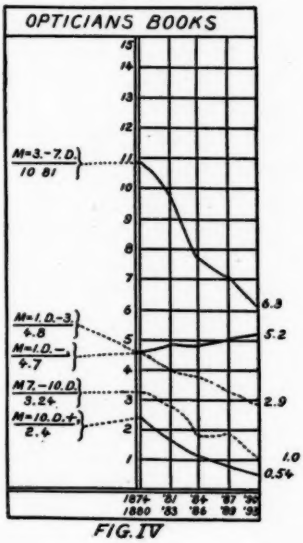

FIG. IV

in the lowering of the grade is almost identical for both the private records and the books of the optical companies as shown in the percentage curves. The significance of the figures cannot be too strongly urged as setting forth the value of modern ophthalmological methods to the community in the prevention of myopia. Thus in the tables and in Figs. 1 and 2 the percentage of myopia, beginning in the first period with 28.43 % is seen to have fallen steadily through the succeeding periods to 16.78 % in the last period. Figs. 3 and 5 however, are if possible of even more importance since they show a fall approximating 50 % in the patients applying for treatment with myopia of 10. D. or greater, and a closely corresponding decrease in the cases with M. of 3. D. to 10. D. When we stop to consider the grave peril which ever waits upon the higher grades of near sight because of the serious pathological conditions so constantly present, not to mention the annoying discomforts and the serious extent to which its victims are handicapped in the race for the emoluments of life, we can but congratulate ourselves that such opportunity has been placed within our reach to render a valuable and lasting service to our fellows. During late years I have been called upon much less frequently to treat detachments of the retina and eyes which have been seriously impaired by macular hemorrhages and atrophies. Indeed it was this impression which suggested this study at the first, but the result has been, not only to demonstrate the correctness of the impression, but I am convinced has also furnished the explanation.

A RARE CASE OF RETINITIS PIGMENTOSA COMPLICATED WITH GLAUCOMA.[1]

By Dr. L. BELLARMINOFF.

Translated by Dr. Robert L. Randolph, of Baltimore, Md.

(*With four figures on Plate IV., vol. xxvii., German edition.*)

THE following case affords an example of an extremely rare and in many respects most interesting coincidence of two diseases in the same eye, retinitis pigmentosa and glaucoma.

Ivan Nikiporoff, peasant, forty years old, was first seen on the 7th of December, 1892. He came to the clinic complaining of pain in both eyes, and especially in the right eye, and also gradual loss of sight.

History: About a year ago he caught cold while in an intoxicated condition, and suddenly thereafter his sight began to fail in the right eye, and in six months he was blind in this eye. For the past six months his left eye has been growing weaker. A dull pain in both eyes was associated with the loss of sight. The appearance of colored rings around a flame and hemeralopia had characterized the earlier part of his history. In his youth he had good vision and had never been troubled with hemeralopia. His father died at eighty years of age, and his mother at seventy, and both had good vision, though his mother related that during her pregnancy she had suffered with hemeralopia. His full sister died in her fifty-fifth year totally blind. His maternal cousin is blind. His grandparents had good vision at time of death. There had been no marriages in the family between near relations.

[1] From the Ophthalmological Clinic of the Army Medical School in St. Petersburg.

Status præsens: Externally there was to be seen, especially in right eye, a marked dilatation of the anterior ciliary veins. Anterior chamber shallow, pupils moderately dilated, right pupil larger than left. Sluggish pupillary reaction. R.E., T + 2, L.E., T + 1. The functional disturbances were pronounced. In the right eye light perception was only present by central fixation. Weak sources of light were not appreciated. In the left eye there was $M = \frac{1}{12}$, $V = \frac{20}{40}$. The field of vision was narrowed in this eye almost to the point of fixation, and the limits of the field were from the outer side 20°, above 15°, below 10°, and inward 15°. In the twilight and by artificial light the patient was practically almost helpless.

An ophthalmoscopic examination with transmitted light revealed transparent media, except that on the outer side of the pupil there was a slight clouding of the lens. Here indeed there were very small opacities (cataracta incipiens), but they did not prevent a satisfactory examination of the fundus with both the direct and indirect method.

In the inverted image the fundus presents the following points (Fig. 1). The optic papilla had an oval shape, the longest diameter running from above inward to below outward. The entire surface of the papilla was pressed back and lay much deeper than the periphery, the latter being sharply defined. There was presented then the characteristic picture of a pathological excavation. The entire periphery, as is frequently seen in glaucomatous excavations, was surmounted by an atrophic ring. On the border of the excavation the vessels were almost lost. One venous trunk could be plainly seen, and this only disappeared at a short distance from the edge of the papilla. A closer scrutiny revealed five or six fine vessels, which soon disappeared, on the border of the atrophic ring. These vessels from their calibre appeared to be smaller than those usually seen on the outer and inner side of the normal papilla. On the inner border of the papilla itself, it was barely possible to make out the contours of two vessels that diverged at this point. All the vessels without an exception were sharply bent at the border of the disc, a proof that the excavation was a very deep one, and one that had over-

hanging edges. At the point where the largest vessel was bent there was to be seen a small pigmentary deposit intimately associated with the wall of the vessel.

That portion of the fundus lying next to the papilla presented marked changes, there being in this location an absence of the retinal pigment, presenting, in other words, the condition of atrophy. And in consequence the choroidal vessels shone through like thick cords surrounding the optic disc on all sides. The interspaces between the vessels shone through with a white reflex in the shape of heavy stripes, that passed away at some distance from the papilla in a radial direction, presenting somewhat the form of a star.

The yellow spot had sharply bounded contours, with here and there traces of pigment.

The *periphery of the fundus* presented quite another picture. From the most remote points on the periphery up to within a small zone bounding the yellow spot, the entire retina was the seat of a multitude of black pigment spots, points, and stripes, all lying in the substance of the retina. These little spots lay on a yellowish-red background that did not appear everywhere homogeneous. Here, too, the retinal pigment had disappeared, so that the choroidal vessels and the white interspaces were plainly visible. The little points of pigment lay undoubtedly in front of the choroidal vessels, in other words, in the retina, and they had generally the shape of a star with two or three branches, which looked like the ramifications of vessels.

In some points these masses of pigment would be seen interwoven in such a manner as to interfere with the fundus reflex. In other places were to be seen smaller isolated deposits having short offshoots. As a general thing these pigment spots were so close together as to constitute the bulk of the retina, while what appeared to be normal retinal tissue was confined to really a very small area. Another very prominent peculiarity of this part of the fundus was the *entire absence of any retinal vessels.* In the *erect image*, all the changes just described came out in well defined detail, and especially well marked was this the case with the

optic nerve excavation, which in its centre gave a myopia of 4.0 D. On the border of the papilla, seven very thin vessels could be made out, and all these disappeared over the edge of the disc. The large branches of the choroidal vessels (see Fig. 2) with the interjacent white stripes where the pigment was absent, the atrophic ring around the papilla, and the degeneration of the yellow spot—all this appeared plainer and sharper than in the inverted image, and especially beautiful did the periphery of the retina appear.

The little masses of pigment, which were everywhere present throughout the retina, formed with their curved and anastomosing branches, a peculiar figured net, worked out of black material, and stretched upon a brilliant red background. In spite of the most careful search, it was not possible, even in the erect image, to find on this net any of the retinal vessels.

The ophthalmoscopic picture of *the left eye* differed from that of the right only in the degree of the changes, the character of them being identical with the changes most met with in the right eye (see Fig. 3). The media were perfectly transparent. The disc was of normal size and shape, and had a slightly bluish-gray color. The excavation was not so pronounced as in the other eye, and the borders sloped gradually to the centre. The blood-vessels were easily seen, though they were abnormally small. The fundus was not so rich in vessels as one is accustomed to find it in the normal eye. There were no sharp deviations in the courses of the vessels on the border of the disc, and this fact pointed to the existence of a very trifling excavation.

The periphery of the fundus lying immediately adjacent to the disc showed the characteristic decay of the retinal pigment.

The *region of the yellow spot* was not sharply defined, and was traversed by the stripes just described.

The *periphery of the retina* presented the same pigmentary changes as were seen in the right eye, and this part of the retina was bounded by a ring concentric to the papilla, and lying off from the papilla at a distance of about $2\frac{1}{4}$–$2\frac{1}{3}$ times the diameter of the latter. The degeneration of the pig-

ment was less marked than in the right eye. The vascular ramifications were visible, but were not so numerous as in the normal eye.

The choroidal vessels were present here in great number.

Diagnosis.—From the clinical history and objective features just enumerated it was clear that the case was one of retinitis pigmentosa associated with chronic glaucoma. Both processes were more pronounced in the right eye. This is the first case of the kind with which I have met, and in spite of the most careful search I have been unable to find in the literature of the subject anything similar. In the atlases of Jäger, Liebreich, Galezowski, Bouchut, Martin, and Magnus, there was no picture of the fundus that corresponded to the description of the one in this report. I am justified then in regarding this case as the first of its kind that has been described. The question is why are the two diseases found so seldom associated. Retinitis pigmentosa is comparatively speaking a common disease, and one meets with glaucoma still more frequently. This then would not lead us to regard the co-existence of these diseases as a specially rare occurrence, but since their co-existence has practically never been observed, the thought suggests itself whether or not they can be antagonists, and this I believe is a very natural supposition. We know that in retinitis pigmentosa we have an interstitial process in the retina and a narrowing and obliteration of the retinal vessels. As a result the process extends to the choroid and optic nerve. In consequence of this disease we have a lessened blood capacity in the eye, and the filtration of the fluids into the orbit is diminished. These factors would necessarily conflict with the existence of glaucoma, but a different state of things must exist in those exceptional cases where, as a result of the interstitial process in the choroid (and especially in that part where the venæ vorticosæ come out), there is connective-tissue formation. And since the connective tissue lessens the diameters of the latter (venæ vort.), the conditions are straightway presented for an elevation of intra-ocular pressure. It seems to me that we have here just these conditions, for the interstitial

process in the choroid appears to be well marked. Theoretical considerations will not contribute to the solution of this question, but the fact remains that chronic glaucoma, complicated with retinitis pigmentosa, does not generally occur, and when the two diseases are found together it is a very rare condition.

1. As regards the diagnosis, it is an interesting question as to which process commenced first. The ophthalmoscopic picture and clinical history lead us to believe that the retinal affection preceded the glaucoma; certainly the character of the changes in the retinæ pointed to a very advanced stage of the disease. The glaucoma in all probability first showed itself a year ago, at a time coinciding with the rapid decline in vision that was especially marked in the right eye. The glaucoma in the left eye was evidently in its incipient stage. Taking into consideration these facts, we may assert that the glaucoma made its appearance at a period much later than the development of the retinitis pigmentosa.

2. The complete loss of sight in the right eye was not explained by the retinal changes, since the macular region and that part of the fundus lying near the papilla were free from pigmentation, and generally speaking a picture of this kind means only partial loss of sight. Evidently the glaucomatous process had lead to the blindness in this eye. The same fate is to be expected for the left eye.

3. The narrowing of the visual field in the left eye (see the scheme) was characterised in two respects. (*a*) It was excessively wide in its boundaries, and this did not coincide with the slight commencing symptoms of the glaucoma, but it corresponded perfectly with the progress of the pigment degeneration in this eye. (*b*) The visual field was excentric and included more the inner periphery. This is not characteristic of retinitis pigmentosa, but on the other hand is very typical of glaucoma. As regards the field of vision then, both diseases exhibited their characteristic peculiarities, a still further proof in this case that the retinal affection was of longer standing than the glaucoma.

4. A remarkable peculiarity of the fundus of the

right eye was the unusually small number of retinal vessels. With convex lens No. 3 it was possible to make out four or five minute branches which disappeared at the points where the pigmentation began. Even in the erect image it was impossible to make out the trunk of a single vessel. The question suggests itself, How can the retina be nourished with so few vessels? It is highly probable that the choroid takes upon itself the nutrition of the retina in such a case, especially in that part of the periphery where there are absolutely no vessels. This disappearance of the vessels is due to the retinitis pigmentosa and to the elevation of intra-ocular tension. Of this we were convinced by the fact that in the left eye, where there was almost the same degree of pigmentary degeneration but fewer manifestations of glaucoma, there was a condition of vascularization not so marked as in the normal eye, but for all that quite plain. Hence we can rightly claim that retinitis pigmentosa associated with increased intra-ocular tension contributes to and hastens atresia of the vessels, and that we can find the highest grade of obliteration of the retinal vessels where the two conditions just mentioned are met with in combination.

5. As regards treatment the miotics were used methodically for eight days without the slightest effect. Possibly an iridectomy might delay blindness in the left eye, but to this operation the patient would not consent.

SUPPLEMENT.

This paper had gone to the press when the author came across a short report of two cases of retinitis pigmentosa complicated with glaucoma by Dr. Mandelstamm, (*Klinische Vort. über die Augenkrankh.*, iii. Lieferung, 1891, Russ. edition). In one case Dr. Mandelstamm found a deep excavation with narrowing of visual field up to the fixation point, and at the same time the characteristic changes of retinitis pigmentosa.

ADDENDA TO AN ARTICLE: "RARE FAMILY HISTORY OF COLOBOMA OF THE IRIS."[1]

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(*With two drawings and a chart.*)

I HAVE previously reported in these ARCHIVES the history of the Payne family. At the time of that report I had evidence of seven members of this family, in two generations, who presented coloboma of the iris.

Since the publication of that report my inquiries have brought to my notice two additional cases in this same family, and each new case also adds another generation to the list. These inquiries have also cleared up practically all of the family data, either positively or negatively, so that now this family history may take its final shape, with no possibility of any further changes, and very little probability of any further additions.

At the time of my former report the only one of the family personally known to me was a male (affected) member of the first generation. He had a daughter (affected) who had some years previously married and gone to California. I had sent a letter of inquiry to her, and after tedious delay received a tardy response, but too late to be utilized at that time. She reported that she had a son affected in the same way as herself. It was the letter of an unobservant, illiterate woman; but from its statements, together with the answers to some of my leading questions, the following points may

[1] These ARCHIVES, vol. xv., March, 1886.

be considered established. (I had asked her to go to some oculist or clinic in San Francisco, and have a report sent to me, but she seems unduly sensitive over her defect and her son's, and has so far failed to do so.)

Boy, æt. fifteen. The boy is in good general health, and no other malformations are mentioned. His eyes are much worse than his mother's, and she thinks that they are even worse than his grandfather's (*v.* former report). He is the only child. He is able to read good sized type held very close, but never made much progress at school. He is able to count fingers across their rather small room—twelve to fifteen feet I presume. She answers affirmatively that he cannot see directly upwards, so I infer that there is also a coloboma of the choroid. The iris is brown. The father (a mechanic) encloses a rather rude drawing of the eye, and makes the statement that the two eyes are about alike. This drawing, touched up a little as regards detail, is represented in Fig. 1. From this the defect can be seen to belong to the broad, complete variety of coloboma of the iris. It may be termed the "oval" or "elliptical" form of coloboma.

FIG. 1

This case is interesting because it completes the line of *three* generations in succession—father, daughter, and grandson. But two other examples of this are known to me in the literature of the subject. The first example is one of the oldest of the recorded cases. Conradi (*Handbuch der pathologischen Anatomie*, Hanover, 1796) reports a family with this defect occurring in father, daughter, and granddaughter. In modern literature another example is found. Streatfeild (*Royal London Ophthalmic Hospital Reports*, vol. i., p. 153, 1858) reports a family with this defect occurring in father, son, and grandson. I myself have had the rare good fortune to run across another family (a full report of which I am preparing) where there are also three affected generations in line. These, however, are not all cases of coloboma iridis. The father had irideremia, the son colobbma, and the granddaughter irideremia.

In the first generation of the Payne family, the eldest son (not affected) had gone West very many years ago, and had been lost sight of. It was supposed that he had never married. His eldest sister (affected) had followed him West; had married; and had a son and two daughters, all three of whom had normal eyes. But it seems that this eldest brother, who was a guide and trapper, had made his home with his sister; later had married and settled in her neighborhood; and had two sons, the eyes of both being normal. The elder of these married the younger daughter, the youngest child of the three mentioned above.

With this marriage of *first cousins*, one of whom was from an affected mother, it would not have been surprising to have seen the affection appear afresh in the next generation. But this couple had four children, two sons and two daughters, in all of whom the eyes were normal.

The second of the children, and the elder of the two sons, a railroad man, came East last summer owing to the extreme stringency out West and secured a position in the Adams Express Co.'s service. Inquiries I had made several years ago concerning his grandmother had given him my name and address; and he recently brought his little son for my inspection.

Willie Payne, æt. six. The little boy is unusually large, strong, and healthy. There are no other malformations. The right eye normal. In the left eye there is a narrow conical coloboma of the iris (Fig. 2). The iris is blue. The pupil has a fair response to light, being displaced downward on contraction. The lower edge of the lens has the normal curvature. The ophthalmoscope shows some hypermetropia. There is no coloboma of the choroid, and the fundus is normal. V. seems as good as in the other eye; but the little fellow is just learning his alphabet, is timid with strangers, and the test is not certain.

FIG. 2

This is the second of three children, the other two being both normal. Mr. Payne knows that so far all of his

nephews and nieces, seven in number, have normal eyes, as regards this coloboma at least.

This case is of extreme interest. The offspring of first cousins not showing what might almost be called the family defect is noteworthy, but not specially remarkable. But for *two* generations to be jumped over and then the defect again appear is, I believe, unique. I know of no parallel case.

In certain hereditary eye troubles (for example, hemeralopia and hereditary optic nerve atrophy) it seems almost a rule for females to be exempted and then their sons to again present the defect. There are many examples of this given in the literature; probably the following being as characteristic as any. Pflueger (*Bericht ueber die Augenklinik zu Bern*, 1882) gives a family chart that is one of the most typical in illustration of this rule in the former disease. Gould (*Annals of Ophthalmology and Otology*, vol. ii., No. 4, Oct., 1893) gives a family chart that typically illustrates this rule in the latter disease.

One instance in the defect we are studying follows the same rule. Streatfeild (in the family report above quoted) gives an example where the father is affected, the daughter is normal, and then three grandsons are affected. In another family merely mentioned in that same report he refers to a man whose sister and grandfather were affected; by implication the intervening parent was free, but whether this was father or mother cannot be ascertained from his casual reference.

But in the present instance the normal interval runs down a female and a male generation, and then the defect again appears in a great-grandson. In another branch of this family the defect occurs in both mother and daughter. In another branch, as we have seen in the first case given in this report, the defect occurs in both mother and son; so that this rule of female exemption but transmission cannot apply to this defect: certainly not in this family.

In fact, the hereditary transmission seems to vary so that no law of descent can possibly be formulated from the data that are available to date. In the recorded cases (of which

I possess notes), where the defect occurs in two generations, they can be arranged in the following classification:

Father and son	8	examples
" " daughter	5	"
Mother " son	7	"
" " daughter	6	"

From which, of course, no very positive deduction is possible.

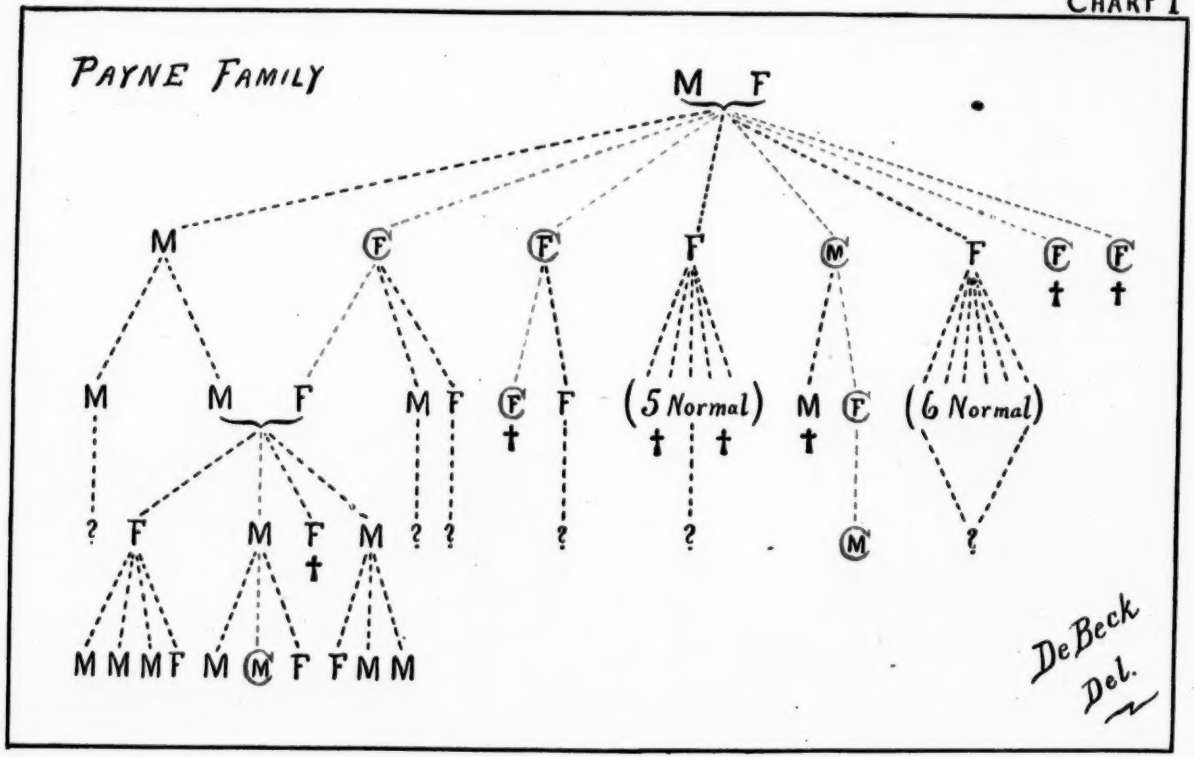
The opinion of Arlt that the defect came more frequently from the paternal side is not here supported, for the number of fathers and mothers is just equal, viz., 13. The view that the sons are more liable to inherit the defect than the daughters, receives some support from this table, for the number of sons showing the defect is 15; while the number of daughters is but 11. But these figures are much too small to base any positive conclusions upon. The figures are so nearly even that we may assume that the question of sex is of no importance and exerts no influence in this particular congenital malformation.

The entire family is given, in a form readily studied, in the Chart I. The males indicated by M, the females by F. The members presenting coloboma are enclosed by a large red C; and the affected lines of descent are shown by the dotted lines in red, the unaffected lines being in black. Lines that have died out are marked †; the several branches (normal when last known) that have been lost sight of are now marked ?.

This family chart is unique in one respect—it is the first one tabulated to date in which this defect shows itself in *four* generations. Of course, the four are *not in line*; but no other family tabulation shows such persistence of this congenital defect. Family charts of irideremia, hemeralopia, retinitis pigmentosa, optic atrophy, congenital cataract, we have with four and even more generations; but up to this time no example of coloboma iridis of more than three generations—and only two of these.

As to whether this defect becomes milder or more severe in successive generations, the evidence is conflicting. In

CHART 1


PAYNE FAMILY
M F
M
F
F
F
M
F
F
F
M
F
F
F
(5 Normal)
M
F
(6 Normal)
M F
F F
M F
M F M
? F
M M M F
M M F
F M M
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the second case here reported the defect was slight and the vision not affected; but in the first case the defect was exaggerated and the vision badly impaired. In the other family I have met, the defect in the third generation became an irideremia, with vision badly impaired. In Streatfeild's case the defects in the grandsons were slight, being small, or only deep notches, and vision does not seem to have been impaired. In Conradi's case no details are given on this point.

From the relatively large number of examples of two generations affected, and the rarity of those with three, the tendency seems to be to return to normal.

A CONTRIBUTION TO THE STUDY OF THE CONGENITAL MALFORMATIONS OF THE EYE.

By Dr. S. BERNHEIMER,

DOCENT OF OPHTHALMOLOGY IN THE UNIVERSITY OF VIENNA.

(*With one figure in the text.*)

Translated by Dr. Ward A. Holden.

In 1887 Hans Virchow described in the *Köllicker Festschrift* "a remarkable case of congenital hydrocephalus internus, being also a contribution to the question of microphthalmus." The eyes of this patient, in external appearance normal, were sent to my late teacher, Otto Becker, who gave them to me for examination, but various causes delayed the work, and it is now offered in the hope that it may still be welcome.

Virchow's case was a female infant whose mother had scoliasis. It died of convulsions in the sixth week. There was a marked curvature of the spine to the left and many minor skeletal irregularities, and considerable dissymmetry between the two lateral halves of the body.

The chief disturbance in the brain consisted of a hydrocephalus and the consequent abnormal cerebral development. The hydrocephalus and the hydropic dilatation of the lymph spaces in certain portions of the brain arose in the course of a chronic leptomeningitis which caused, besides the hydrops, an aplasia of the portions of the brain adherent to the diseased pia. In the disturbance were involved the olfactory tract, and the entire region between brain and eye; and there was also a number of cysts, the

largest of which occupied the region of the chiasm. This cyst, of particular interest for us on account of its location, was adherent both to the floor of the cranium and to the base of the brain, and was necessarily ruptured in the removal of the brain. From the outer surface of the cyst layers of loose connective tissue could be torn off, and the inner surface was lined with epithelial cells. Above the cyst was a flattened cord containing medullated nerve fibres. Chiasm and tracts were wanting.

Portions of the vesicle remaining adherent to the floor of the cranium showed a mosaic of pigmented cells, like the pigment epithelium, and were connected with the two optic foramina.

The eyeballs were very small, but the muscular and lachrymal apparatus were normal in both. The left pupil was not circular. The axis of the left eye was 12 *mm* long, and lying to the lateral side of the optic nerve was a cyst 6 *mm* long, filled with clear fluid. The right eye was continued posteriorly in a thick stalk, and was about the size of the left. In place of the nerve was a sheath containing but a single vessel, and to its lateral side a cyst continuous with the posterior and inferior portion of the ball.

In horizontal sections, from the middle of the left eye (Fig. 1) the flat, small, but normally developed cornea, together with the equally thick sclera, surround the almost circular eyeball. The anterior chamber is shallow, but the iris-angle is free, and the ligamentum pectinatum is well developed. The iris and the ciliary body and processes are more developed on the temporal than on the nasal side.

The lens is small, egg-shaped, and cataractous. No zonula fibres can be found.

The retina is completely detached and much folded, and to the temporal side of the stalk at the optic disc is a tumor projecting slightly inward, and composed of tissue similar to that of the retina.

The optic nerve has a peculiar appearance. Nerve tissue can scarcely be found. A third of the nerve tissue has been converted into a cyst of egg-form, communicating by a narrow cleft with the cavity of the eyeball.

The pigment epithelium and the choroid are normal and in position. Near the choroidal ring the choroid is somewhat thickened and choroidal pigment may be traced back into the wall of the cyst.

Vitreous tissue cannot be found.

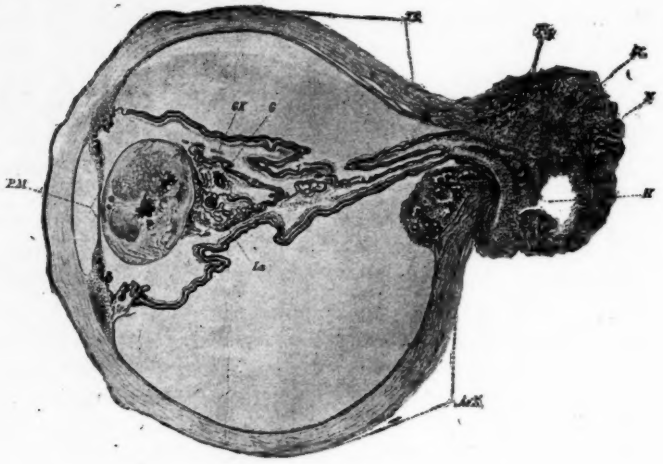

FIG. I.

Under a higher power, the cornea and sclera present a normal structure. The iris shows no signs of inflammation. The pigment layer does not cover the pupillary margin of the iris, but from this layer a thin membrane composed of round and spindle cells passes through the pupil, and apparently represents an unabsorbed portion of the embryonic pupillary membrane. With the high power a few zonula fibres can be seen.

The lens fibres are swollen in the greater portion of the lens and the nuclei are indistinct. Among the fibres are clefts and cavities. The posterior capsule is lined in almost its entire extent, like the anterior capsule, with epithelial cells which have often an irregular arrangement. This is no doubt the condition, first described by H. Müller and O. Becker, of epithelial proliferation along the posterior capsule in cataractous lenses. The posterior surface of the

lens is closely connected with the altered retinal tissue behind it, by a delicate cellular connective-tissue meshwork.

The optic nerve as such is wanting; and in its place is a very cellular connective-tissue stroma, with portions having a gliomatous character, and enclosing cavities of various size; far back some medullated nerve fibres can be seen.

The right eye is in the main similar to the left. The cornea, sclera, iris, and ciliary body are fairly well developed. The lens is larger than that of the other eye, and is in a more advanced stage of development. The posterior segment of the ball is continued backward in a tubular formation, on the lateral side of which rests an egg-shaped cyst. The walls of the tube and cystic diverticulum consist chiefly of tracts of connective tissue with some loose fatty tissue, and are directly continuous with the sclera. The cavity of the distended sheath is filled for the most part with altered choroid and retina. The retinal tissue on the inner surface of the cyst is continuous with that lining the ball, and particularly with that tract of retina which is adherent to the posterior surface of the lens. The choroid in the region of the tube is thickened, as is also the pigment epithelium, and their character is altered more as the cyst is approached.

Two years ago, Rindfleisch described a case of bilateral microphthalmus with cystic posterior ectasia, complicated with hydrocephalus. The development of the brain had been disturbed by the collection of hydrocephalic fluid, which had dilated the ventricles and forced its way to the surface of the hemispheres, transforming the cerebellum into a cyst the size of a hen's egg. While the cerebellum rested on the inner surface of the cranium, the hemispheres of the cerebrum were separated from the cranium by a collection of subarachnoid fluid. All the irregularities in the floor of the cranium had been obliterated by the internal pressure. The roofs of the orbits were concave upward, and the orbits thus depressed contained microphthalmic eyeballs with communicating cystic structures. The eyeballs showed a rudimentary iris, a coloboma of the choroid and total detachment of the retina with folding. The adherent structure consisted of a cystic cavity surrounded by

a hernia-like protrusion of the retina. This extended forward, dividing into several diverticula having walls of scar tissue with some retinal elements. In one eye there was a coloboma of the ciliary body and a peculiar second crescentic line of nuclei in the lens.

According to Rindfleisch, the hydrocephalic process had not only levelled the base of the skull, but had also exerted such pressure on the roof of the orbit as to force this downward and cause a separation of the freshly united ocular cleft, and thus give rise to the cysts. All other changes could be considered consequences of the cyst formation and secondary disturbances of nutrition.

Such an explanation would not hold good for the case under consideration. Here there were cerebral and ocular changes of quite similar nature which could not be brought into connection with abnormal conditions of pressure.

The brain showed, besides symptoms of a chronic leptomeningitis, with hydrops, destruction of epithelium, and proliferation of glia cells, also cystoid changes, and these were also found between the brain and eye, particularly in the region of the chiasm. These cystic changes being similar it would seem, *a priori*, that there had been parallel changes in cerebrum, thalamencephalon, and eye, the degenerative changes starting centrally and extending peripherically.

The non-development of the eyeballs, and the secondary changes in choroid, retina, and lens, may possibly be referred to the cystic changes behind the eye.

The first demonstrable histological cause of the changes in the brain was a chronic leptomeningitis, but whether this was indeed the primary cause is not certain. The microscopic structure of the cysts was the same, all containing elements similar to those of the ocular vesicle. It is therefore almost certain that the morbid process, whatever its nature may have been, began in the thalamencephalon, and began probably at a time when the ocular vesicle was still connected with the brain.

The lens in the left eye showed a condition such as would be found about the end of the second period of development, from which it may be concluded that the morbid

process had begun in the lens at the sixth or seventh week at the latest.

All the changes in the eye may be referred genetically to an early affection of the thalamencephalon, although this is hardly sufficient to account for ocular malformations in general. I shall not discuss here the hypotheses of Arlt, Kundrat, Manz, Michel, Deutschmann, Van Duyse, Mitvalski, Czermak, Hess, Rindfleisch and others, but would only suggest that in future investigations more definite knowledge of the cause of ocular malformations may be obtained, if the brain is subjected to a careful examination as well as the eye.

A NOTE ON THE ACTION OF THE OBLIQUE MUSCLES IN ASTIGMATISM.

By HAROLD WILSON, M.D., Detroit, Mich.

In a recent work upon miscellaneous ophthalmological topics,[1] Dr. G. C. Savage has set forth with some detail a theory of the harmonious action of the oblique muscles on the eyeball in cases of astigmatism with oblique axes. According to the author, it is necessary, in order to secure binocular single vision in oblique astigmatism for the eyeballs to be rotated upon their antero-posterior axes by the harmonious action of either the superior or inferior oblique muscles. This action is rendered necessary by an assumed rotation of the image in the affected eye, consequent upon the obliquity of the astigmatic axis. A series of diagrammatic illustrations is given showing the rotation of the image upon the retina in various kinds of astigmatism. Thus in a case where there is a hyperopic astigmatism with the meridian of greatest corneal curvature at 135° in the right eye, the image (an arrow) is represented as being rotated to the right, while in the left eye, the meridian of greatest curvature being at 45°, the image is shown rotated to the left, as shown in Fig. 1, from Savage.

Of course, to bring these two images upon corresponding retinal points necessitates the combined action of the superior oblique muscles, as an inspection of the diagram easily shows. The point made by Dr. Savage is that without this compensatory rotation, diplopia will occur, and that when the rotation does take place, there is a strain due to

[1] *New Truths in Ophthalmology*, G. C. Savage, M.D., 1893.

the excessive demands made upon the oblique muscles, which form of strain does not exist in astigmatism when the axes are at 90° and 180°. All this may be quite rational if the premises as to the rotation of the astigmatic image are true. Unfortunately, the demonstration of this important matter is not given in the article quoted, and is referred to only in the most general way. It is my purpose here, to inquire briefly into the truth of this assertion, for upon its establishment the whole of the author's argument rests.

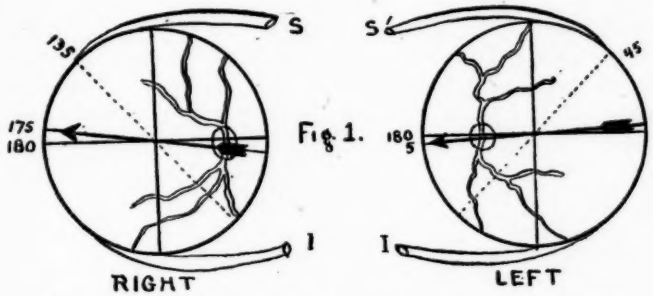

Fig. 1.

A pencil of rays emanating from a luminous point of any object and passing into a homogeneous refracting medium whose limiting surface is that of a tri-axial ellipsoid, as is well known, is nowhere again united in a single point. Its image consists of a diffusion figure included within, or bounded by two focal planes, and having a skew or warped surface. What the forms of the images of a point formed by any meridian of such a refracting surface are, can be easily demonstrated by constructing from the trial-case the sphero-cylindrical equivalent of such a surface, and examining the images of the sun or any other luminous point upon a screen, covering the aperture of the lenses with a diaphragm having a narrow slit along one of its diameters. This diaphragm may be rotated, and the images of any desired meridian examined. If the axis of the sphero-cylinder is vertical, the vertical meridian will give at the anterior focal plane a diffuse vertical line which gradually shortens as the screen is moved backward to the second focal plane where it becomes a point; the horizontal, or meridian of greatest

curvature will give, under the same circumstances, a point at the first focal plane, and a gradually lengthening horizontal line. Any oblique meridian will be found to give an image in the form of a diffuse line of light oblique to the plane of the principal meridians, and as the screen is moved toward the second focal plane this line rotates toward the plane of the meridian of greatest curvature. Thus, symmetrical oblique meridians cause a symmetrical but opposite rotation, the meridian of greatest curvature being midway between them. This fact of opposite rotation is also well shown by looking at horizontal and vertical lines through a simple cylindrical spectacle lens with its axis oblique, and so held as to give virtual images of the lines. With the same position of the lens, vertical lines will appear to have been rotated in one direction, and horizontal lines in another. Thus the image of a cross having vertical and horizontal limbs, the axis of the lens being at 45°, is of the shape shown in Fig. 2*a*; with the axis at 135° it takes the shape shown in Fig. 2*b*.

FIG. 2.

The form of the limiting surface of the pencil refracted by an astigmatic surface as a whole, is full of mathematical complexities, but it will not be necessary to enter upon these here in order to complete our inquiry. Experiments to illustrate the total effect of an astigmatic surface upon the combined pencils from any object, are easily made and naturally suggest themselves. From what has been shown, and from the further experiments suggested, the following facts will become evident:

1. The image of a luminous point formed by any of the oblique meridians of a tri-axial ellipsoid, or astigmatic surface of refraction, is an helical or screw-like figure, the direction of rotation of which varies as the inclination of the meridian taken, and toward the plane of greatest curvature of the refracting surface.

2. Owing to the fact that the rotation caused by symmetrical oblique meridians is equal and opposite, it is manifestly impossible for such a surface, to cause an actual rotation of any object, when acting in its entirety, though it may cause an apparent rotation of linear objects.

3. The diffusion image of any object is distorted, the amount and character of the distortion depending upon the form of the object, and the position of the observed image with respect to the focal planes of the astigmatic surface.

4. The diffusion images of lines oblique to the principal meridians undergo an apparent rotation of a definite sort, because their transverse distortion is so small, as compared with that in the direction of their length, as to be disregarded.

If these conclusions are true, the general application of Dr. Savage's so-called "harmonious symmetrical action of the oblique muscles" falls to the ground. At least it must undergo a very decided modification. The last observation in the summary above affords the only real basis for any such theory of the rotation of the eyeballs. Let us examine this briefly. If the astigmatic eye were to regard in an object simply any set of lines or planes oblique to its principal meridians, and whether these meridians are at 90° and 180°, or at any other axes, is immaterial, these lines or planes would show an apparent rotation, varying with their obliquity, and the amount of the astigmatism. A set of lines or planes perpendicular to these would be rotated oppositely. If on the other hand, the eye should regard both sets of lines or planes equally—that is, the object as a whole, except where it was a linear object, the image would not be rotated; it would be simply distorted. But it is a well-known fact that the ametropic eye naturally prefers to form, if possible, diffusion-lines rather than diffusion-circles or ellipses upon its retina,—

to obtain which, the under-corrected myope, for example, tilts his glasses, so that some selection by the eye, of particular lines or plane of an object, is probably true. It does not follow, however, that these lines or planes are always the same; rather is it more likely that they are not. It is probable that those diffusion-lines would be selected, where possible, which gave the most distinct images. Thus, in the same eye, at one time, the diffusion-line upon the retina might be rotated to the right; at another to the left, while at another time there might be no rotation at all. Moreover, except in high degrees of astigmatism, the amount of rotation when present would be very small. Thus, in the case illustrated by Dr. Savage in the diagrams given above, if the object viewed had been a vertical arrow, instead of a horizontal one, with precisely the same conditions as to the astigmatism, with the proper alteration of the accommodation, the apparent displacement of the image might be as illustrated in Fig. 3.

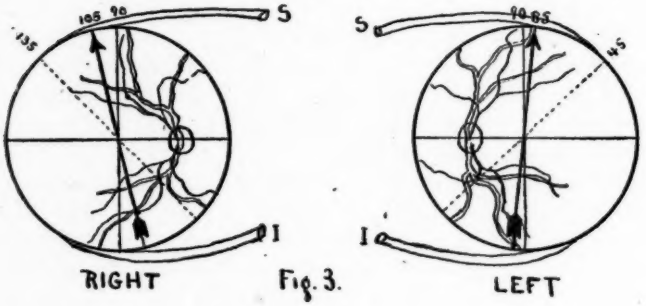

Fig. 3.

In any case, therefore, where the astigmatism of the two eyes is not identical, there may be a failure in correspondence between the two retinal diffusion-images of linear objects, inducing a partial diplopia, if such it may be called, and a compensatory rotation of the eyeballs to overcome this seems a very likely occurrence; but, owing to the variable rotation of the image, this rotation of the eyeballs must be also variable; so that if it is effected by the superior

oblique muscles at one time, the horizontal diffusion-lines, for example, of the object viewed predominating, at another time, the vertical diffusion-lines predominating, it will be effected by the inferior oblique muscles.

From these considerations, the following conclusions seem to be warranted:

1. Compensatory rotation of the eyeballs in astigmatism will be necessary in order to secure binocular single vision whenever the predominant diffusion-lines of any object upon the retina of one eye, and the normal or diffusion-line image in the other eye do not fall upon corresponding retinal points.

2. This lack of retinal correspondence, or rotation of the image, is a function of

(a) The amount and character of the astigmatism,
(b) The nature of the ametropia (probably),
(c) The nature of the object viewed,
(d) The action of the ciliary muscle.

SOME CASES OF OPTIC NERVE TROUBLE.[1]

By Dr. R. L. THOMSON, Spokane, Wash.

INFLAMMATION of the optic nerve is a comparatively common disease. The histories of some cases that I wish to report to you I hope will add some light as to its etiology.

Case 1. *In a Family in which the Father had Blue, the Mother Black Eyes; the Blue-Eyed Children had Normal Sight, the Black Eyed became Blind.*—James H., a strong man with blue eyes, married a woman with blue eyes. Their only child has blue eyes and good vision. The wife died, and Mr. H. married a comparatively healthy woman who had very black eyes. Their first child has blue eyes, and now, at the age of thirty or more, has perfectly good vision. Their second child, a girl, had dark-brown eyes. She lost her sight at six years of age, grew fleshy, and died at fourteen. An eminent ophthalmologist diagnosed the case as optic atrophy. Their third child, a boy, had very black eyes. He lost his sight at eight, and died at about eighteen. He was subject to convulsions before he died. The fourth child, a girl, had very black eyes. She became blind at six years of age, and died in her seventeenth year. She had "some kind of nervous spells before she died." Their fifth child, a boy, had brown eyes. He is now twenty-one years of age and has good vision.

I have not been able to trace the history of the mother's family.

Case 2. *Traumatic Optic Neuritis; Recovery.*—W. R., aged twenty-five, came to us February 22, 1894. He stated that on February 10, while trying to hold a horse, he was thrown violently down, striking his head against the frozen ground. He

[1] Read before the Washington State Medical Society, May 3, 1894.

was stunned, and when he arose felt dizzy, and could not see with his left eye.

When he came to the office, twelve days after the accident, we found he had a typical case of optic neuritis in left eye, and beginning neuritis in right. R. V. $\frac{20}{15}$ — L. V. $\frac{5}{200}$. We gave him a Turkish bath and put him on increasing doses of iodide of potassium. Two days later his vision in left eye was $\frac{10}{200}$. We continued the treatment, and on March 6th his R. V. $\frac{20}{15}$ +, and his L. V. $\frac{20}{30}$. At this time we could partly outline the left disc.

He now reports that his eyes are perfectly well.

Case 3. *Toxic Amblyopia with Pallor of Optic Discs; Recovery.*—W. G., aged fifty, came to see me in April, 1893. For years he had been a steady drinker, and an almost constant user of tobacco. He stated that he noticed that his sight was failing about two months before he applied for relief.

On examination I found the optic nerves quite pale. His R. V. $\frac{20}{200}$, L. V. $\frac{10}{200}$. I stopped the use of all stimulants, substituting chewing-gum for the tobacco. I gave him hypodermics of strychnia. His vision steadily improved till July 6, when it was R. V. $\frac{20}{15}$, L. V. $\frac{20}{60}$, at which it has remained. He stated that he had never seen so well out of the right eye as out of the left.

This, I think, was a plain case of whiskey and tobacco amblyopia. Without treatment this man would have gone blind.

I do not believe any treatment will improve an atrophied nerve.

Case 4. *Conjugate Deviation and Dyslexia; Recovery.*—Mrs. H., aged forty, had enjoyed good health till about March 1st. While calling on some friends she was suddenly seized with a severe pain in her forehead. Her eyes turned to the right and she could not turn them straight. Her sight became dim. March 10 she was brought to our office. She was greatly excited about herself. Her pulse was 130, and she had a distinct mitral regurgitant murmur. There was no elevation of temperature. Pupils responded quickly to light. There was paresis of the left external rectus muscle, which produced double vision. The eyes were hypermetropic, with a physiological cup in each disc. There was hemorrhage in each cup surrounding the exit of the veins.

When asked to read the test letters she became greatly excited,

and said she could see them, but did not know them. In a test with the dummy card she showed a vision of $\frac{2}{3}\frac{0}{0}$ — in each eye. She could see small print, but had forgotten how to read. She talked rationally. Under the use of iodide of potassium and electricity her vision has improved to $\frac{2}{3}\frac{0}{0}$ + in each eye, and the paresis is much improved.

I will add another case, the diagnosis of which I will leave to you.

Case 5. *Quinine Amblyopia; Recovery.*—G. D. F. was brought to us September 21, 1893. When led into the office he presented the appearance of a blind man. When told to sit down, he felt for the chair as if he could only see the outline of it. He answered questions slowly but rationally.

He stated that while working in the field in July, 1893, he got very hot, felt weak, and went to a shade. While there he "threw up." He went home. In the afternoon he discovered that he could not read. He had no pain, but continued to feel very weak. The following night he awoke and struck several matches, trying to make a light. He burnt his hand, and not seeing the fire, he concluded he was blind.

A test with Snellen's type showed a vision of only $\frac{4}{2\,0\,0}$ in each eye. The optic discs looked pale, and the blood-vessels rather small. The pupils were moderately dilated and did not respond to light. There was paresis of accommodation, but there was no paralysis. Tendon reflexes were good. If asked to walk across the room and back, he would do so with a strong, steady step.

I supposed this was a case of intra-cranial hemorrhage with subsequent optic atrophy. I had very little hope of doing him any good. I gave him a hypodermic of strychnia, and instructed him to return next day. At the second visit I again examined him carefully. While testing his vision he walked toward the card with a hesitating step. When within four feet of it he said: "Doctor, I can see them!" I said: "See what?" "Why, all them letters." I backed him off twenty feet, and to my astonishment he read $\frac{2}{1}\frac{0}{0}$ with each eye.

I withdrew my hasty diagnosis and turned the case over to a general practitioner.

I subsequently learned that on the day Mr. F. was taken ill, he had drunk, during the morning, a pint of whiskey which contained two drams of quinine.

A CASE OF COMPLETE DESTRUCTION OF BOTH LACHRYMAL DUCTS.

By JOHN DUNN, M.D., Richmond, Va.

SOME months ago I reported a case of complete destruction of the intra-nasal contents. There was one point of especial interest to ophthalmologists omitted in the report. The patient, a mulatto woman, aged about twenty-one, has lost from syphilis within the past few years the entire contents of the nasal cavities. The entire septum, bony and cartilaginous, from the cribriform plate of the ethmoid to the floor of the nose has been destroyed. All of the ethmoid cells of both sides, posterior, middle, and anterior, are gone. So are the middle and superior turbinates and unciform process of both sides. Likewise there remains no trace of either inferior turbinate, whose lachrymal, ethmoidal, and maxillary processes have also disappeared. The nasal and maxillary air spaces are thus one continuous cavity, and as the internal maxillary bony walls of the maxillary antrum of either side are little developed, the line of demarcation between nasal and maxillary cavities is not well defined. The point I wish to call attention to in this second report of this case is: a straight probe passed through the inferior canaliculus, horizontally, passes directly into the nasal cavity. It may be required to pass the probe slightly backward, but this is difficult to say. Of course, *the whole of the lachrymal duct has been destroyed.* The protection for this duct formed by the lachrymal process of the inferior turbinate is gone. Not only so, but, of necessity, that the probe may pass as it does, a part at least of the lachrymal bone has been destroyed—and the same holds for both

sides. Of course, the lachrymo-ethmoidal cells are all gone. Further than this, the thin layer of bone from the nasal process of the superior maxilla, forming a part of the inner bony boundary for the lachrymal duct, is also destroyed. There is then left of the lachrymal discharge system only the canaliculi, superior and inferior, and the remains of the lachrymal sac, whose inner wall has formed directly inward a fistulous opening into the nasal cavities. This fistulous opening represents, doubtless, the lowest remaining part of the lachrymal sac. Of course, the entire bridge of the nose is sunken in, thereby causing the skin at the root of the nose to infringe somewhat upon the inner canthus of either side.

There is no lachrymation. This shows that so long as the puncta are open and in their proper relation with the eye-ball, the canaliculi normal, and there is any exit for the tears from the sac, there will be no lachrymation. The case suggests, too, in certain cases of obstruction to the lachrymal flow, the propriety of opening the lachrymal sac through its outer wall, and then of forcing an opening through the inner wall and through the lachrymal bone into the nasal cavity in the region of the lachrymo-ethmoidal cells. It might be difficult to prevent this inner opening from closing, but once maintained as a fistula it would give results comparable to those obtained by nature in the case above reported.

In connection with the above remarks on the lachrymal discharge system, the following observation may be of interest as showing that where there supervenes no inflammation the punctum and canaliculus may remain open indefinitely, although precluded from taking part in carrying the tears from the eye.

Mary S., aged fifty-seven, at the age of three received a burn in the skin of the lower lid just beneath the inner canthus The resulting scar caused eversion of the inner half of lower lid and with it the punctum, which, when I saw it, was at least half an inch or more from the ball, measured over the everted conjunctive, which, of course, was thickened and inflamed. Examination with a needle probe showed the punctum still open and the canaliculus patent its whole length.

IS THERE CO-EXCITATION OF HOMONYMOUS SECTIONS OF THE VISUAL FIELD SUCH AS SCHIELE HAS DESCRIBED?

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Translated by Dr. A. B. KIBBE, Spokane, Washington.

(*With Plates V. and VI. of Vol. XXVII., German Edition.*)

UNDER the title "Co-excitation of Homonymous Sections of the Visual Field," Dr. Schiele, in vol. xvi., page 145 of these ARCHIVES (Germ. ed.), has presented a theory which appeared to further essentially our knowledge of the nature of so-called anæsthesia of the retina, or nervous asthenopia. Schiele claims to have demonstrated that the so-called retinal fatigue must be looked upon as fatigue of the occipital lobe. He came to this conclusion from a number of observations, the essential result of which is as follows: When, by long-continued perimetric examination of one sector of the visual field, the eye becomes so fatigued that the outer limits of the sector become progressively narrower, examination of the eye hitherto covered will show a decided contraction of the sector homonymous to that of the first eye.

That the results of Schiele's examinations are absolutely accurate, does not admit of proof from purely theoretical reasons. He used Scherk's perimeter and a white square 20 *mm* each way as test-object. Such a square, at the distance of the perimeter's radius (1 foot), appears at a visual angle of almost 4°. With this large object he has measured

the visual field with extraordinary exactness, distinguishing differences of 0.9°. This in itself is an evidence of lack of accuracy. In spite of these opinions however, we have proceeded to a completely unrestricted test of his results.

Method of Examination.—Before proceeding, attention must be called to a difference between Schiele's and our method. Schiele used Scherk's perimeter and a square 20 *mm* each way, while in the following experiments Foerster's perimeter was used, and a white square at most 5 *mm* each way on a black ground. The use of such a small object appeared to be necessary in order to obtain exact results. This slight difference in the conduction of the experiments, which otherwise were made in accordance with the directions of Schiele, can have no essential influence on the result; it may make quantitative, but not qualitative differences. The fatigue experiments were only made upon such patients as presented a pronounced form of Foerster's displacement type. At the beginning of each set of examinations, the visual field of one, and immediately after of the other, eye was taken according to the so-called diametric method of Schiele; that is, the object was passed along the meridian to be examined, from the temporal side of the visual field, and pushed slowly across the fixation point as far as the nasal limit. The point at which the object became visible at the temporal side, and the point where it disappeared at the nasal side, were both noted. The repetition of the same manœuvre in five meridians gave the outer limits of the visual field. A so-called control test—that is, the carrying of the object from the nasal to the temporal side—was omitted, as the presence of Foerster's displacement type had been verified in all persons examined. The test of the visual field of the first eye was marked I, the second II. In addition, either one half of the visual field or a quadrant of one eye was fatigued by a series of tests, the other remaining closed. Here Schiele's so-called radial centripetal method found application. The test-object was passed along each single meridian of the sector to be examined from the periphery to the fixation point, but not farther. That point was always taken as the outer border of the vis-

ual field, in this as in all other examinations, at which the patient became aware of the presence of a bright spot on the dark arc of the perimeter, not the point at which the object was clearly recognized in form. The first test of that section of the visual field to be fatigued was followed by a second, third, etc., whereby the single meridians were always examined in regular order. Each of such tests required on an average from two to three minutes. After such a given section of the visual field was fatigued by a series of (for example, eight) examinations (visual field III to X), a complete test of the visual field of both eyes was made with the same test-object (visual field XI and XII). In both of the latter examinations the diametric method was used as in tests I and II. A comparison of the tests I and II, and XI and XII reveals, without anything further, the accuracy or inaccuracy of Schiele's theory for the accompanying case.

When in what follows mention is made of "fatigue" of the visual field, this term is used in place of the more precise "changes in the outer limits of the visual fields by continuous testing." For the sake of simplicity, the expression "fatigue," used by Schiele, has been retained, without implying anything as to the nature of the changes in the visual field. If one fatigues in the described manner one sector of the visual field, in case the same is capable of fatigue, a slightly different boundary is obtained with each examination, and, according to the statement of Schiele, these boundaries of the visual field, or fatigue curves as they may be briefly called, should preserve an equal distance from one another. This could not be verified by our examinations; on the contrary, the fatigue curves cross one an other in the most manifold way, whereby it was often impossible to recognize a given form, as the visual field became either progressively narrower or was widened at the beginning and contracted later on. An approach to such regularity of fatigue curves as Schiele describes we never found. This was to be expected from the first.

In order to more closely describe the course of fatigue curves in those persons who were examined, a few ex-

amples should be presented. A chart of these curves shows, in the main, a confused mass of lines, and is with difficulty understood. On this account no such drawing has been presented. Only the outer borders of the visual field in successive fatigue tests have been presented in figures. In the following tables—for example, Table I.—the meridians of the visual field are placed in the first horizontal row, according to Foerster's plan. In the first vertical division those tests made for the purpose of producing fatigue of the visual field are marked with Roman numerals in the order in which they were made. Each vertical division contains the parallel circle up to which the outer limit of the visual field reaches on the meridian indicated at the top of the column. The last column contains the average. This average shows very easily whether the visual field has been contracted or widened by fatigue.

CASE I.—Helene B., eight years of age, visited the polyclinic June 21, 1892. The visual field shows slight contraction in its outer borders only (10° to 15°), on the contrary there is a pronounced displacement type of from 5° to 10°. June 23d an attempt was made to fatigue the lower and outer quadrant of the left eye of this patient. For this purpose the outer limit of this quadrant was defined by six successive tests of the visual field, requiring in all twelve minutes. Each test began with the outer half of the horizontal, and closed with the lower half of the vertical meridian. The test-object was carried from the periphery up to the fixation point, but not farther. The result of this experiment is contained in Table I.

TABLE I.

FATIGUE OF THE OUTER LOWER QUADRANT OF VISUAL FIELD OF LEFT EYE.

	MERIDIAN.						
Test	90°	100°	120°	140°	160°	180°	Average
I	67°	66°	67°	60°	68°	70°	68
II	70	76	73	82	64	60	71
III	76	76	76	68	72	66	72
IV	76	88	86	78	80	68	79
V	68	85	56	66	62	56	65½
VI	58	68	68	56	56	66	62

Examining the averages shows that the visual field became progressively wider up to the fourth test, and then quickly contracted to below its original limits, but neither the widening nor the contraction progressed in a regular manner. Up to the fourth test the visual field widened progressively 3°, 1°, and 7°, then contracted, first 14°, then 3½°. That form of fatigue so often seen by Schiele, "that the visual field of the fatigued eye" contracts by an equal amount with each successive test, is not present once in any of our averages. Quite as seldom is that form present which Schiele describes as a degree of fatigue which in the beginning is strong, and by every new test becomes less. At 180°, for example, the visual field contracts at the beginning, instead of widening, increases in the two following tests, and at the fifth becomes markedly narrower, then increases again instead of contracting. Thus, while the visual field in one meridian contracts, it widens in another. The fatigue curves do not run parallel with one another, but cross frequently.

TABLE II.

(FATIGUE OF OUTER AND LOWER QUADRANT VISUAL FIELD, LEFT EYE.)

	MERIDIAN.						
Test.	90°	100°	120°	140°	160°	180°	Average.
I	58	56	48	44	54	42	50
II	36	26	44	48	72	62	48
III	72	48	68	58	76	67	65
IV	75	68	58	76	78	65	70
V	72	66	66	66	74	63	68

A test made upon the same patient two days previously, with the same test-object and upon the same quadrant, produced a quite similar result. Table II contains the figures.

The averages give at the beginning a slight contraction of the outer borders of the visual field (I and II), the two following tests (III and IV) a widening, which is again followed by a contraction.

CASE 2.—Martha M., ten years of age, visited the clinic May 21, 1892. Visual field contracted concentrically 10°. Shows Foerster's displacement type. On June 24, 1892, the inner half of

the visual field of the right eye was fatigued by eight successive tests, lasting twenty-two minutes. As in previously described experiments, the test-object was carried from the periphery to the fixation point only. Each test began with the meridian 340°, then followed 300°, 270°, 240°, and finally 200°. Table III gives the results.

TABLE III.

(FATIGUE OF INNER HALF OF VISUAL FIELD, RIGHT EYE. FIG. 1B.)

Test.	MERIDIAN. 340°	300°	270°	240°	200°	Average.
III	54	57	56	46	55	54
IV	52	56	53	43	53	51
V	42	56	47	42	53	50
VI	47	45	45	44	52	47
VII	48	49	45	38	40	44
VIII	34	46	44	32	38	39
IX	32	37	37	28	26	32
X	28	34	34	26	37	31½

The fatigue experiments in Table III are numbered III to X, instead of I to VIII, as a complete visual field of each eye (I and II) had been made previously. This system of numbering was adopted in order to correspond with the numbers of visual field tests in figures I a and b. Four days later the inner half of the visual field of the left eye of the same patient was fatigued by eight successive field tests. The meridians 270°, 300°, 340°, 200°, and 240° were passed over in successive order. Table IV shows the result of the examination. The numbers of visual field tests III to X are in accord with those in figure I a and b throughout.

TABLE IV.

(FATIGUE OF THE INNER HALF VISUAL FIELD, LEFT EYE. FIG. 2A.)

Test.	MERIDIAN. 270°	300°	340°	200°	240°	Average.
III	42	36	37	38	44	39
IV	26	16	12	13	18	17
V	12	13	10	7	10	10
VI	8	12	13	19	22	15
VII	37	34	36	34	37	36
VIII	46	54	47	48	40	47
IX	40	35	28	33	44	36
X	45	46	34	32	33	38

The visual field of this patient, as a glance at the averages of Table IV shows, became progressively narrower up to the fifth test, then markedly increased in area up to the eighth, once more contracted, and again widened. The degree of fatigue represented by the enlarging (+) and diminishing (–) of the visual field with every new examination amounts, according to the averages, to –22 –7 +5 +21 +11 –11 and +2°. The widening and narrowing of the visual field, in this as in all other cases, does not take place in the manner observed by Schiele. It would require too much space to report singly all the fatigue experiments which gave a positive result, their number amounting to more than twenty. The evidence furnished by the experiment has been sufficiently shown in the accompanying reports. In no single instance was there even an approach to the regularity in fatigue curves that Schiele has described.

In what way is the second eye influenced by fatigue of the first? We now pass to the proof of the most important point of Schiele's claims, viz., the transference of fatigue contraction of one sector of the visual field to the homonymous sector of the second eye. The experiments made for this purpose were carried out in the manner described in the directions given by Schiele. First, the complete visual field of one eye was taken, followed immediately by that of the second, and following this a sector of one eye was fatigued by a series of examinations (for example from III to X). In conclusion the visual field of both eyes was taken (XI and XII). Unless otherwise stated, a white square 5 *mm* each way, on a black ground, served as a test-object. In plates I to VI only the results of tests I and II, and XI and XII are delineated, the fatigue curves from III to X being omitted. The Roman numerals in the plates show the number of times the visual field was taken, while the Arabic figures denote the single meridians which were tested, and the arrows the direction in which the test-object was moved. From the large number of these experiments only a few may be reported in detail, the others having given an exactly similar result.

Experiment 1 (plate I a and b, table III, page 292).—Fatigue of the inner half of the visual field of the right eye.

This experiment was made on June 24, '92, with Martha M. (Case 2, page 292) in the following manner: The visual field of the left (I), and then that of the right, eye was taken by passing the test-object from the temporal side of the visual field past the fixation point and up to the limit of the nasal side. Five meridians of each eye were successively tested in the manner shown by plates I a and b. This required seven minutes. The boundaries of the visual field showed by this first test only a slight contraction. The inner half of the visual field of the right eye was then fatigued by eight successive tests (III to X). This required twenty-two minutes. The more exact method (carrying the object from the nasal side to the fixation point) has been already described, and the result given in table III, page 292. The inner half of the visual field of the right eye was contracted on an average 32° by these eight tests. Following this the entire visual field of the hitherto closed left eye (XI), and immediately thereafter that of the right (XII), was taken. These two latter tests required fourteen minutes, so that the entire experiment lasted about thirty-six minutes. That the inner half of the visual field of the right eye was really fatigued is shown by its contraction (table III and plate I b). What influence now did this fatigue have upon the other eye? The outer half of the visual field of the first eye, which is homonymous to the fatigued section of the right eye, shows a contraction of from 10° to 20° (figure I a). The inner half of the visual field of the same eye is in general unaltered. This experiment, therefore, appears to have substantiated the claim of Schiele, "that fatigue of the inner half of the visual field of the right eye shows a contraction of only the homonymous external half of the visual field of the left eye." But, if we consider the result of taking the visual field (XII), we find that the visual field of the right eye is not only contracted on the inner, but in the outer half as well, from 10° to 15°. *It has happened that the continuous fatigue experiment on the inner half of the visual field of the right eye has caused a contraction*

of the homonymous visual field of the left eye, without further change of the inner half of the visual field; at the same time, however, a contraction of the outer half of the visual field of the right eye has made its appearance, which could not be the case if Schiele's hypothesis were correct.

Experiment 2 (plates II a and II b, and table IV, page 292).—Fatigue of the inner half of the visual field of the right eye.

On the same patient with whom Experiment 1 was made (Case 2, page 291), fatigue of the inner half of the visual field of the left eye was produced (figure II a and b). Visual field tests I and II were taken within nine minutes in almost the same manner as in Experiment 1. Following this, the inner half of the visual field of the left eye was fatigued by eight tests (III to X). Table IV, page 292, shows the result. The visual field contracted at the beginning, and, after widening somewhat, again began to contract. The average expansion of the inner half of the visual field at the tenth testing amounted to 38°. The visual field of the right eye was now tested (XI). It showed in each meridian examined a contraction of from 6° to 20°. The following test of the visual field of the left eye (XII) gave an equal contraction in all meridians. The least narrowing was upward and outward (2°), while in all other meridians it amounted to from 10° to 24°. The result of our examinations is accordingly as follows: With fatigue of the inner half of the visual field of one, in many cases, contraction of the entire field of both eyes frequently shows itself. This is contrary to Schiele's observations.

Experiment 3 (figure III a and III b).—Fatiguing of the outer half of the visual field of the right eye.

A third fatigue experiment was made with the same patient on the outer half of the visual field of the right eye (figure III a and b). On the 24th of June, '92, the visual field of the right eye (I), and following this that of the left eye (II), were both taken in the preceding manner. Next, the outer half of the visual field of the right eye was fatigued by six visual-field tests on meridians 90°, 120°, 160°, 20°, and 60°. The object was carried from the temporal side to the fixation point. The visual field became larger with each

successive test, and reached at the eighth, on meridian 90°, 78; 120°, 82; meridian 160°, 66; 20°, 44; and 60°, 54, outwards from the fixation point. The fatigue curve showed the same irregular course as in all previous experiments. In the same way as in tests I and II, the entire visual field of the left eye (IX) was taken, and immediately after that of the right eye (X). The entire experiment lasted thirty minutes. The result was very remarkable (figure III). The visual field of the non-fatigued left eye showed a contraction throughout of from 14° to 50°. The visual field of the right eye exhibited an expansion of the fatigued outer half of the visual field of from 15° to 34°, and a contraction of the inner half of the visual field of from 6° to 20°. Experiment 3, from this, shows the following results: When, through long-continued testing of the outer half of the visual field of one eye, the limits of this half become widened, in certain cases the inner half of the visual field of the same eye, as well as the entire visual field of the second eye, may show contraction. This is not in accord with the statements of Schiele. It is worthy of note that Experiments 1 and 3, although made on the same patient, nevertheless showed exceedingly diverse results. The test of the visual fields (plates I and III), taken at different times, have throughout failed to give corresponding limits of the non-fatigued visual field, an observation not uncommon in anæsthesia of the retina.

Experiment 4 (figure IV a and b).—Fatigue of the outer half of the visual field of the left eye.

June 28, 1892, the outer half of the visual field of the left eye was fatigued in a patient suffering from traumatic neurosis (Case 4.). The procedure was the same as in all previous experiments. The eight tests showed as a result a contraction of the limits of the outer half of the visual field of the left eye averaging 46°. Following this, the entire visual field of first the left and then the right eye was again taken in the same manner as in tests I and II. The result showed a moderate concentric narrowing of the limits of the visual field of the left fatigued eye in almost all meridians; while the right eye, in most of the meridians,

exhibited a slight contraction. In a few there was no change, and in one a perceptible widening. If the claims of Schiele were correct, the inner half of the visual field of the left eye should have shown no contraction through fatigue of its outer half; quite as little should the outer half of the visual field of the right eye have shown a contraction of its outer borders. The result of this experiment again contradicts the statement of Schiele.

Experiment 5 (figure V a and V b.).—Fatigue of the outer half of the visual field of the right eye.

Fig. V a and b illustrates a fatigue experiment which was made June 6, 1892, with Paul Sch., waiter, thirty years of age (Case 5). Immediately prior to and after the fatigue experiment, the visual field of each eye was taken by carrying the test-object from the temporal side (tests I and II and VIII and IX, figure V a and b). The outer half of the visual field of the right eye was then fatigued. It contracted, exclusive of a passing widening, with each new test, in an increasing manner, so that the limits of the visual field were finally narrowed about 6°. A comparison of the visual fields which were taken last, with those taken first, gives for the right eye a contraction of the fatigued outer half of the visual field, and for the inner non-fatigued half, exclusive of meridian 300°, a widening. The visual field of the left eye shows a widening of the inner, and, up to one meridian, 160°, a contraction of the outer half. While, therefore, the outer half of the visual field of the right eye has become narrower through a series of visual-field tests, the inner or homonymous half of the visual field of the left eye has become widened. The inner half of the visual field of the right eye, which was not directly affected by the fatigue experiments, shows a widening, and that half of the visual field of the left eye homonymous to it, a contraction. These experiments, therefore, indicate that homonymous sections of the visual fields do not show like, but, on the contrary, opposite changes, which contradicts Schiele's theory completely.

Experiment 6 (figure VI a and VI b).—Fatigue of the lower outer quadrants of the visual field of the left eye.

Ida N., ten years of age. The visual field shows at first but slight concentric contraction, with displacement type, but later examinations frequently repeated often showed a high degree of concentric contraction. On the 20th of June, 1892, the visual field of each eye was taken with a white square 10 *mm* each way, in the same way as in all other experiments. The same showed a pronounced contraction of the visual field (figure VI, tests I and II). The lower outer quadrant of the visual field of the left eye was now tested with the same object in six meridians, producing a contraction averaging 6°. Then followed tests of the visual field VIII and IX, which were made in the same method as tests I and II. The result was very remarkable. While the lower outer quadrant of the visual field of the left eye was fatigued as stated, the entire outer half of the visual field of the left eye showed itself to be contracted in a high degree. An analogous contraction was also shown in the outer half of the visual field of the right eye, so that the visual field presented almost the picture of a temporal hemianopsia (figure VI, visual-field tests VIII and IX). In the left eye, the nasal half of the visual field was widened, in the right eye contracted. Three days prior to this the upper and outer quadrant of the visual field of the right eye was fatigued in a similar way, and became very strongly contracted. The result was similar to that previously described. Both temporal halves of the visual field were contracted almost to the vertical meridian, with imperceptible changes of the inner half. Both experiments showed that in this case the fatigue of one quadrant of the outer half of the visual field caused a perceptible contraction of both outer halves, with only slight changes in the inner half.

Conclusions: It is superfluous to enumerate further experiments. Those which have been given suffice fully to explain the results which have been collected in what follows.

1. The fatigue curves, as shown in the plates and tables, do not run in any case with even an approach to the regularity that Schiele claims to have found; on the contrary, they cross one another in the most manifold way.

2. The statement of Schiele that "contraction of the outer borders of one sector of the visual field has no influence upon the outer borders of adjacent sectors nor of any other portion of the same visual field," could not be substantiated by our experiments; on the contrary, it is found, as plates I to VI show, that almost always fatigue of one sector of the visual field is accompanied by changes in the outer borders of other sectors of the visual field of the same eye.

3. Schiele makes the statement: "Fatigue of the visual sphere which is caused by taking the visual field of one eye is communicated to those fibres of the second retina which end in it, in such a manner that in every case only homonymous portions of both visual fields show contraction." The previous experiments did not confirm this; for, although in a series of cases the homonymous sector of the visual field of the second eye showed analogous changes in its outer boundaries to the fatigued one in the first eye, this was often not the case (figures III and V). Further, sectors of the second eye which had not been directly fatigued and which were not in the least homonymous to the fatigued sector, gave evidence of having been influenced.

4. If Schiele draws the conclusion from the results of his examinations, that the so-called fatigue of the retina must be considered as fatigue of the cortex of the occipital lobe, evidence for this opinion is wanting, as the results of these experiments are not in accord with those of Schiele.

TWO PECULIAR CASES OF WELL-KNOWN DISEASES OF THE RETINA.

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Translated and condensed by Dr. J. A. Spalding, Portland, Me.

(*With Plate VII., Vol. XXVII., Germ. Ed.*)

I.—EMBOLISM OF THE CENTRAL RETINAL ARTERY.

IN order to obtain a more perfect idea of the alterations to which the retina is subjected, it will always be useful to describe all those cases which vary in the least from the usual types. For this reason I venture to describe two recent cases, one of them being embolism of the central retinal artery, characterized by a moderate amount of restoration of vision, as well as by alterations in one arterial branch, which gives to the ophthalmoscopic image a peculiar appearance.

Mr. S. consulted me in March, 1892, for sudden loss of sight of the left eye on the previous afternoon. He volunteered the remark that his sight was already beginning to return. He is rather corpulent, aged fifty, has suffered from rheumatism, has always had good sight in both eyes, and has but lately begun to wear glasses for presbyopia. The heart is normal, and the patient's habits irreproachable. The only possible cause of the loss of vision is forcible massage of the entire body, and especially of the left side two days before.

The right eye and field are normal. The left eye has a pallid fundus, very thin retinal arteries, so thin as to appear anæmic, and they are with difficulty to be followed into the periphery. The superior retinal artery alone is brilliant, swollen, and con-

gested as far as the bifurcation of the temporal and nasal branches. The veins are rather more distinct than normal. The papilla is extraordinarily pallid, with some pigment at the outer margin, whilst some patches of the same are scattered about the fundus of the eye.

I explained to the patient that one of the blood-vessels of the eye had become obstructed with a clot, probably owing to the massage, and that the issue was doubtful, although the increase of vision from the total blindness of the previous afternoon was somewhat hopeful. I told him to come the next day, keeping as quiet as possible, to have dry cups to the neck, hot foot baths, and gentle laxatives.

He joyfully exclaimed as he came in the next morning that the sight was still further improving; but the ophthalmoscopic image was totally different from what it had been before. The entire fundus outward from the papilla was now misty white, with a reddish spot at the macula only. The arteries disappear *in toto* on entering this patch, but the veins seem rather more distinct. A few vessels start from the papilla toward the macula, but do not quite reach it. The periphery of the retina, especially inward, is normal in color. The papilla is very white; blood-vessels distinct, the superior retinal artery being particularly well marked. Compare Fig. 1.[1]

On the following day the visual field had cleared off still more, the centre being still quite dark, but large objects could be clearly seen. The ophthalmoscopic image remained about the same as before.

The question now arose, whence the obstruction had come, and how had the circulation re-established itself.

At the first instant the circulation must have ceased, as shown by the total obscuration of sight and loss of the left visual field. The gradual restoration of the latter might be due to the propulsion of the clot from the main artery into one of the branches, though it was also possible that, either a slight current of blood had made its way beyond the clot, or a collateral circulation had become established.

The turgescence of the upper branch of the superior retinal artery as far as the bifurcation into the nasal and temporal branches, suggested that there must be nearly a complete occlusion at this spot, but up to the time that the ophthalmoscopic

[1] The chromolithographs are all in the erect image, but they are slightly reduced in size in comparison with the normal measurements.

examination was made, the two arteries leading from there were not so empty of blood that some slight circulation within them could be denied.

It was also very remarkable that the arteries running to the lower portion of the retina were as devoid of blood as the upper ones, proving that the obstruction affected the entire arterial branch on that side. Collateral circulation might have been established by the fine vessels given off beneath the obstruction, and then arising into the retina and nourishing it anew. From this point of view we may note the presence of a few delicate vessels arising at the margin of the optic papilla, and losing themselves toward the periphery of the retina.

The field having cleared off so much, a measurement was made March 7th showing indistinct perception at the point of fixation. A piece of white paper 1 *cm* in diameter near this point is recognized with a little effort, but when moved away it disappears at once and only comes again into sight at the 15° mark. The obscured portion extends on each side to about the same amount, and then the field reappears as far out as 50° in every direction. The visual field consequently bears some resemblance to an egg with the large oval downward. A square piece of paper was seen to about the same amount. The peripheral perception is about the same in each eye.

The improvement was very slight and gradual. No treatment was given except laxatives and small doses of iodide of potassium. As the field cleared, the retina assumed more and more of a normal tint, though the vessels remained permanently contracted, and paler than normal, especially the superior artery of the retina.

The patient was attacked with pneumonia in April, and no observation of the eye was possible till May, when the retina seemed of the normal color excepting a milky-white patch at the yellow spot. Vision is still poor. He can distinguish large objects but cannot read. He can see single letters standing alone, but all connection between them is interrupted by a mist. The field remains substantially the same ; central perception for round and square pieces of paper, then a clear space of 5°, then obscuration to 15° then clear light to the periphery. But as the patient cannot read, it is plain that central vision is lost *in toto*. Colored pieces of paper are seen at or near the centre of vision about the same as white.

The patient returned in the following year, simply to find if anything more could be done. There was no alteration in the sight; he could still see large letters only, and the field was as before.

The ophthalmoscopic image, however, varied considerably from its former appearance, a local circumscribed portion of the superior retinal artery having become sclerotic. While all the other retinal vessels appeared collectively narrower, the temporal branch of the superior artery was double its normal width. The anomaly begins where the temporal branch is given off, is about as long as one disc-diameter, and extends to where this branch gives off three smaller ones, and even a little beyond. The sclerosis is well set off from the rest of the fundus by its extreme whiteness. The centre of the artery also exhibits a very narrow white line suggesting a passage for slight circulation in the altered portion, but no complete obstruction at this point.

Fig. 2 exhibits the spot in question and in the erect image at the time of the patient's last visit.

Remarks.—The first appearances in this case showed that the superior retinal artery had taken considerable share in an embolism apparently belonging exclusively to the central artery. This was shown in the congestion of this branch up to its point of bifurcation, the pallor this side of that spot, and the downward defect in the visual field. We also note the remarkable alterations in this vessel, not where it arises from the lamina cribrosa, but beyond in the temporal branch. Hence we must feel that the cause of the obstruction must have been an insignificant mass which was swept as far as the upper retinal artery, and at first remained clogging its first bifurcation. In the course of time this substance was propelled onward into the temporal branch, as far as where the vessel again divides into three. In this way the circulation in the upper and outer quadrant of the retina was chiefly obstructed. Whether the circulation in the rest of the retina were perfectly restored or not would be hard to decide. The deficient nourishment of the retina lasted, however, so long, that total destruction of the light-perceiving elements just beneath and above the centre of the retina was accomplished. Finally, we must not forget the district

within the region of the yellow spot where some remnant of vision remained to a greater extent than either just above or below.

In considering the *origin*, *structure*, and *fate* of the substance which disturbed the retinal circulation, we can express but mere surmises. The least certainty lies in an answer concerning the *origin* of the obstructing mass. It could not have been any firm substance. The heart and vessels were normal. It seems as if the previous violent massage must have had a share in the production of a thrombus in some blood-vessel.

Hayem and Bizzozero have shown[1] that, beside the two constant structures of the blood, the red and white corpuscles, there is a third, the so-called blood-lamellæ, which play a prominent and almost specific rôle in the coagulation of the blood. Eberth and Schimmelbusch also consider[2] that an injury occasionally forms a thrombus which, in the form of a blood-lamella, bruises the injured spot in the vascular wall, after which fresh lamellæ follow and cling to the spot so that the thrombus increases more and more by apposition. More recent investigations by the same authors[3] modify this assertion, adding: "Thrombi do not generally arise from these places of smooth desquamation of various layers of the vascular walls, but from the *edges* of such defects, from the injured, corrugated middle coat, from the points and projections of the cicatrix hanging loose in the lumen. These are the points where thrombi are discovered."

There was no proof of any such lesion in our case, but we cannot assert that there was no injury at all.

So far as the *nature* of the thrombus in this patient is concerned, we have the right to believe that it did not consist of organized tissue, or even of a firm fibrous clot, but that it was probably composed of blood-lamellæ. Such a one often contains, additionally, red and white corpuscles. Thrombi of blood-lamellæ are at first yielding, easily compressible, and then they change into a uniform, friable, viscid

[1] *Comptes Rendus de l'Académie de Sciences*, 1882 and 1884.
[2] *Virchow's Archiv*, vol. 90 and 195.
[3] *Virchow's Archiv*, vol. 105, p. 463.

mass, and such a consistency here seems to be proven by the further behavior of the plug in the retinal artery.

The *alterations* in the thrombus in the course of the case are verified by the ophthalmoscopic image from time to time. It must have at first cut off all supply of blood to the retina as proved by the total obscuration of the field. On the following day a slight clearing off in the upper and outer angles of the field was observed, and with general anæmia of the retinal vessels, the main stem alone of the upper retinal artery was filled with blood. This could not be produced by a firm clot, but by a soft compressible structure. The ophthalmoscopic image now shows that the greater portion of this mass was next driven into the upper retinal artery where it stagnates at the next point of bifurcation. The inferior artery, however, does not seem to have become sufficiently free for the passage of blood by this first change in the situation of the obstructing mass as proved by its partial emptiness, and the pronounced discoloration around the papilla and yellow spot, on the third day, as well as by defects in the field of vision. We may now assume that the blood has made its way through a viscid mass, as observed in Eberth's and Schimmelbusch's experiments, although in their case an artery was deliberately injured. Their experiment showed a renewal of the circulation through a thrombus of blood-lamellæ, in the form of a thin stream of blood. Nothing prevents a similar condition having occurred in our case, thus producing a more or less enlargement of the channel of the superior artery of the retina. It is also clear that the thrombus was reduced in size, and closely compressed, and finally became firmly fixed in the three finer branches, and there remained. Afterward the distended branch of the superior retinal artery resumed its normal size.

Once fixed, the thrombus did not probably completely obstruct the circulation, for a fine red stripe still traverses the sclerotic district, and the three delicate vessels at that portion of the retina are not totally atrophic even after a year.

Finally the limited sclerosis of the superior retinal artery may have some connection with a firmly obstructing throm-

bus at that point. This seems all the more natural if we imagine that the thrombus in our case was composed of an accumulation of white blood-lamellæ. Nevertheless I have never yet heard of such an occurrence either in the eye or body having been confirmed by an autopsy.

II.—RETINAL DETACHMENT.

A woman of twenty-eight years consulted me in the summer of 1893 for a sudden blindness of the right eye. She had passed through an attack of typhus fever a few weeks before, and during her convalescence she observed obscuration of the right eye. She could only perceive the movement of her hand in the outer portion of the field.

The ophthalmoscopic picture is, generally speaking, as follows: The inner portion of the fundus (erect image) is normal, but the outer shows a retinal detachment, the limit of which passes in a wavy line close to the outer edge of the papilla, and bends above to the inner side and below to the outer. The portion detached does not hang out in a sac-like form as usual, but seems to be marked by innumerable irregular minute ridges. Those that project the most look like brilliant lines of light. In addition to this peculiarity we at once observe two others. One of these is numerous whitish, round, glittering spots scattered all over the detachment. They are distinct upon the brighter folds, but more so in the deeper, darker places. I have never seen anything like this, and have no suggestions to offer concerning it. As the patient came but twice, I cannot say whether the spots changed any in the course of time.

The second peculiarity consists in a distinct and rather extensive rupture of the retina about two papilla-diameters upward and outward, about one papilla-diameter in length and a little less across. The rupture at its outer end is rather blunt, and at its inner end sharpened. It is also well worthy of note that three delicate vessels, two arteries and one vein, run across this rupture, being plainly visible up to the edge, then disappearing behind the red background, and soon reappearing at the upper edge. The remaining vessels in the detached portion of the retina are but slightly varicose in appearance.

Figure 3 gives a reasonably true representation of the peculiarities of this very rare type of retinal detachment.

A CASE OF PERSISTENT HYALOID ARTERY AND COLOBOMA OF THE CHOROID.

By Dr. LOUIS STRICKER, Cincinnati, O.

(*With an Ophthalmoscopic Drawing.*)

In May of the present year, the patient, a girl of nine years, was brought to me to have her eyes tested for glasses. Her vision had been poor since birth, at which time the mother states that the right eye had a peculiar appearance, as though there was a film over it, no doubt due to a pupillary membrane. At present the eyes show no outward sign of any affection, and focal illumination revealed no sign of remains of a pupillary membrane; both pupils react to light.

Each eye was tested at six metres, and showed vision in left eye $= \frac{6}{18}$; right $= \frac{6}{60}$. The ophthalmoscope showed nothing abnormal in the left eye, but with the first flash of light into the right, a large black thread came into view, making the most active vermicular movements. The diagnosis of a persistent hyaloid artery was apparent at once, and the artery could be seen without the slightest difficulty by the merest tyro in the use of the ophthalmoscope simply by using a plane mirror. In the indirect method a large choroidal patch could be seen in the region of the macula.

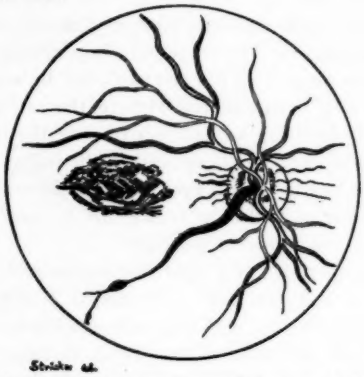
Atropine was put into both eyes in order to make an accurate test of the vision, and also to enable me to more closely study the pathological condition in the right.

Left eye vision $= \frac{6}{18}$. By ophthalmoscope and retinoscope + 1 D $\supset$ cyl. + 1 D ax. 120°. Vision $= \frac{6}{6}$, and Y. 0.50 (the smallest print). The + 1 D cyl. axis 120° was ordered. The right eye showed astigmatism + 1 D ax. vertical, but vision was not improved by its use. On using the ophthalmoscope, the *persistent hyaloid artery at once* came into view and showed itself to be of unusual size, making the most active vermicular movements with every movement of the eyes, showing that it was perfectly free at its distal end. The media are perfectly clear. The hyaloid artery takes its origin directly beneath the centre of the disc where it is perfectly distinct and sharply outlined, bluish-gray in color, and as it proceeds forward it assumes an almost jet-black color. It gives one the impression of being dry and hard, and although it seems to make wavy mo-

tions, these resemble the shaking of a whalebone stay. At its origin it is almost twice the thickness of the veins, and as it extends forward it gradually tapers down until close to its termination it takes on a fusiform shape, beyond which it bifurcates, one of these terminal endings separating into a number of very fine threads. It traverses the entire vitreous, coming close up to the posterior capsule of the lens ; the origin and disc are distinctly visible without a lens, whereas to see the finest terminal endings requires a + 18 D glass.

A very careful examination of the posterior capsule of the lens failed to detect the slightest remains of an adherent hyaloid or a posterior capsular cataract.

In the region of the macula is a transversely oval choroidal patch about one and a half times the size of the papilla. This is no doubt congenital, and can be looked upon as a coloboma of the choroid, being the result possibly of the same slow development which led to the want of power to cause a total absorption of the central artery.



I present this case on account of its great beauty and its typical character. True, we do not to-day look upon this condition as such a rare ophthalmoscopic curiosity. However, very many of the cases reported are of but meagre remains found on the disc, or remains on the posterior capsule of the lens. In 1890 Dr. David De Beck published a very complete monograph on this subject, in which he tabulated all the cases which had been published up to that time, 199 cases in all. Only ten of his cases correspond to the one here reported.

REPORT OF THE OPHTHALMOLOGICAL SECTION OF THE ELEVENTH INTERNATIONAL MEDICAL CONGRESS AT ROME, FROM MARCH 29 TO APRIL 5, 1894.

By Dr. D. E. SULZER.

Translated by Dr. C. Zimmermann, Milwaukee, Wis.

I. Session: Friday, March 30th, 9 A.M.

President: J. Hirschberg (Berlin).

1. Professor Gavet (Lyon) reported two cases of *ocular affections complicating heart-disease.* A man, æt. thirty-five, had suddenly become totally deaf in his left ear December, 1893. After three weeks purulent discharge set in, and the deafness disappeared. In the night from December 28th to 29th the left eye became blind without pain, with panophthalmitis after two days, leading to sloughing of the cornea January 3d. In the enucleated globe staphylococci were found. January 10th he died from infectious endocarditis, which had produced a communication between both auricles of the heart and the left ventricle. The ulcerated valves and other parts of the endocardium were covered with staphylococci. Embolism of the central retinal artery could not be ascertained, nor the entrance of the infection into the body.

The second case was a girl, æt. fourteen, suffering from acute inflammatory rheumatism, complicated with endocarditis, and relapsing frequently. At the last relapse, which proved fatal, a cataract developed rapidly in right eye, with exophthalmus, œdema of the conjunctiva, and blindness. No suppuration. Slight exudation into the anterior chamber. Death a fortnight after the first appearance of the ocular symptoms.

Autopsy: Pericarditis and endocarditis vegetans, some superficial ulcerations at the aorta, infarctions of kidneys and two in the spleen. The central retinal vessels remained entirely free. The retina is very much degenerated and thickened at the ora serrata. No micro-organisms in heart or eye. May we surmise an alteration of the smallest retinal vessels? Gayet believed that the ocular affection was due to rheumatism and that an invasion of the lymphatics by toxines took place, the action of which seems similar to naphthalin, producing changes in the retina and vitreous and cataract.

SULZER (Geneva) thought this case to be analogous to bilateral eye-affections in chronic malarial cachexia.

2. POWER (London): *Shot-gun injury of the orbit.* Aneurysma arterio-venosum; ligature of the carotis communis; recovery. A young man was injured by a revolver ball at the inner side of his left eye. Profuse bleeding, exophthalmus, and perfect loss of mobility. Sight almost lost. After six weeks a pulsation was observed, increasing despite compression of the carotid and the eyeball (by a compress). Fourteen weeks after the injury an almost fatal hemorrhage from the left nostril, which could only be stopped by ligating the left common carotid. The aneurysm healed—with atrophy of the left optic nerve.

MEYER (Paris) and GAYET reported a case of pulsating exophthalmus, healing spontaneously. ANGELUCCI (Palermo) observed incurable crossed hemiplegia after ligature of the common carotid.

3. DUFOUR (Lausanne): *On color perception.* When testing patients with total color blindness with Holmgren's skeins in regard to their luminosity, the results were: 1. Red is seen darkest. Three color-blind persons stated the following in regard to the solar spectrum. 2. The luminosity of red varies with the illumination more than the other colors. 3. Perception of light commences at the line B in light red. 4. It slowly increases, and reaches its maximum in green between the lines E and F.

From these facts Dufour came to the following conclusions: 1. Hering's theory does not explain why color-blind persons perceive the maximum of light intensity in green, whereas that of Young-Helmholtz does. If we suppose that in the cases observed two fundamental sensations are deficient, the remaining would be green. The different shades of green they called "grey."

4. SULZER (Geneva): *Adaptation of the electro-magnet for extraction of pieces of iron from the interior of the eyeball.* In those cases in which a large electro-magnet cannot be obtained or applied, a magnetic probe has to be introduced into the eyeball through an incision. Each end of the instrument forms a magnetic pole. The attractive power under these conditions is slight. An iron chip, approached by a magnet, becomes itself a magnet with two poles. The pole of the magnet introduced induces an opposite pole in the proximal end of the chip, which attracts it, and a homonymous pole in the distal end, which will repel it. The resulting attraction depends on the difference of the distances of both poles of the iron chip from the pole of the magnet. The chips generally being small, this difference and the attraction will be small. If the magnet has a horse-shoe form, both its poles can attract the heteronymous poles of the magnetized piece of iron. Sulzer constructed therefore a horse-shoe magnet, the arms of which are very close together. The point, containing both poles, consists of two half-round iron rods, soldered at each other by a copper plate for isolation. Its posterior end forms a fork, fastened with each prong to each arm of the magnet. This instrument is made by the Geneva society for the manufacture of instruments of precision at a price of 25 francs.

HIRSCHBERG: The ultimate fate of eyes containing pieces of iron depends chiefly on the avoidance of infection. Under careful antisepsis the magnet can be introduced far into the vitreous and moved about, until it touches the foreign body without evil consequences. Hirschberg's simple magnet answered all purposes.

SCHMIDT-RIMPLER (Goettingen) succeeded in the extraction of iron pieces, with the large electro-magnet in about 50 per cent. In one patient the outcoming piece tore out a segment of the iris with subsequent loss of the eye.

WICHERKIEWICZ (Posen): The attractive power of the magnet seems to him of importance, as some foreign bodies are more or less retained by new-formed tissue.

HAAB (Zürich) warmly recommended the large electro-magnet, with which he extracted foreign bodies fifteen times in twenty-one cases. Differing with Hirschberg, he believes that extensive injuries of the vitreous may terminate in the loss of the eye without intervening infection.

SULZER preferred his instrument to the simple magnet, as it removes chips which cannot be extracted by the large electro-

magnet with greater safety and less injury. The latter is very important in regard to infection and the preservation of the greatest amount of vision.

5. Essan (Constantinople): *Treatment of chronic blepharitis ciliaris with strong solutions of sublimate and glycerine* (3–15 per cent. concentration) gave very good results.

6. Viques (Paris): *On tuberculous iritis.* Among the inflammations of the iris tuberculous iritis ought to be classified, preceding the miliary eruption in tuberculosis of the iris. It is characterized by its insidious and gradual development almost without reaction, but with formation of numerous synechiæ. The absence of all pathognomonic symptoms often makes the diagnosis difficult The tendency to spontaneous recovery from tuberculosis of the iris is due to the individual power of resistance and not to an alternation of the carrier of infection or the toxines, as asserted by van Duyse, as pieces of iris of such cases caused tuberculosis of the alveoli and death from general miliary tuberculosis when brought into the anterior chamber of rabbits. [Such cases, if true, must be very rare.—H. K.]

7. Denti (Milan): *Tuberculosis of the uveal tract.* Denti saw spontaneous healing of a case of tuberculosis of the iris and ciliary body, in which half of the anterior chamber was filled with cheesy masses, after the parents had refused the proposed enucleation three months previously. Seclusio pupillæ and pupillary exudations remained.

II. Session: Friday, March 30th, 1:30 P.M.

President: Prof. Gayet (Lyon).

1. De Vincentiis (Naples): *Transplantation of cornea.* In cases of corneal defects Gayet has been successful with transplantation of the cornea of rabbits in four cases. The piece to be transplanted consists of some lamellæ and the anterior epithelium. In a case of very resistant corneal fistula the piece was fixed on the pared margins of the fistula. The two other cases were recurrent prolapses of iris after injury of cornea. The fourth transplantation was performed after excision of a partial staphyloma. The piece was fixed under the ocular conjunctiva, which had been dissected.

2. Van Millingen (Constantinople): *New experiment on keratoplasty and measures against prolapse of iris in simple extrac-*

tions. The results of corneal transplantation are very unsatisfactory, especially in total adherent leucoma with degeneration of the lens. In such cases Millingen trephines the leucoma as far as the vitreous, empties the calcified lens, and applies Sulzer's contact glass, the air between being removed by Anel's syringe with corresponding curvature of the canula. V after that is as good as the average after extraction. In one of his cases it remained so for 1½ years, in another since three months. In a third case panophthalmitis set in five months after the operation.

Van Millingen applies very thin contact glasses, to avoid prolapse of iris after simple extraction. An assortment of them must be on hand for adaptation before the operation (cocaine). It is applied immediately after the operation. The air bubbles are driven away with a 4 per cent. solution of boric acid. This is repeated at every dressing, and the glass is left in place until the fourth day. In fifteen cases van Millingen had perfect success and a more speedy and equal wound healing. The frequency and degree of post-operative astigmatism are lowered by this method.

3. GRADENIGO (Padua) cured a recent detachment of retina by energetic massage of the globe.

HIRSCHBERG achieved the same, adding, however, that this lucky result was very rare.

4. FAGE (Amiens) : *Secondary clearing of the pupillary area in traumatic cataract.* Removal of the swollen lens masses by a small opening as soon as the tension rises. After the inflammatory symptoms have subsided, the pupillary area is thoroughly cleaned.

5. TRUC (Montpellier) : *Trachoma and trachoma-contagion in the region of Montpellier.* (Will be published and reported later.)

III. Session : March 31st, 9 A.M.

President : SCHMIDT-RIMPLER (Goettingen).

1. BOCCHI (Pavia) : Subconjunctival injections of sublimate solutions are most effectual in superficial corneal ulcers with hypopyon, less in parenchymatous keratitis, plastic iritis, traumatic or sympathetic irido-cyclitis. In a case of syphilitic retinitis they were of remarkable success, and in several instances of hypopyon-keratitis, in which sublimate irrigations were of no avail, a single conjunctival injection sufficed to destroy the infection

entirely. Continued sublimate injections ought to be performed with greatest caution. Sublimate injected under the conjunctiva of a dog was transformed into calomel, as could be shown in the tissues microscopically a long time afterwards.

2. GUAITA (Siena) : *Importance of Fraenkel's diplococcus in the pathology of the eye.* Numerous experiments showed him that diplococci implanted in the conjunctival sac caused purulent conjunctivitis, into the cornea hypopyon-keratitis, into the anterior chamber and vitreous violent panophthalmitis. The degree and acuteness of the inflammations depend upon the age of the cultures employed. Cultures from two to three days old are very virulent ; from the fifth day the virulence decreases. In twenty-five cases of hypopyon-keratitis his assistant, D. Gasparicesi, found diplococci twenty-three times with or without staphylococci, and in four cases of panophthalmitis. However it was also found on the normal conjunctiva eight times in ten cases. We attribute an important part to diplococci in pathology of the eye ; it may produce a violent suppuration as well as a plastic inflammation.

HIRSCHBERG found, some time ago, diplococci in eyes enucleated on account of traumatic irido-cyclitis.

3. BASSO (Genoa) : *Bacteriology of hypopyon-keratitis.* Close examination of sixty cases revealed Fraenkel's diplococcus to be the morbid agent in most of them. It may be found as the only micro-organism, if, without coexistence of affections of the lachrymal sac, there is only a very small focus surrounded by a gray halo, before an infiltration of the margin of the ulcer has taken place. Later on it will be found with other micro-organisms, mostly staphylococcus albus and streptococcus pyogenes. Basso found another diplococcus besides, less virulent than Fraenkel's, and causing subacute purulent keratitis in rabbits. Basso thought that in cases without lachrymal complication the diplococcus was propagated from the mouth, in which it was found in most cases of hypopyon-keratitis, perhaps through the saliva, used by some people to cleanse the eyes with.

UHTHOFF found in several cases Fraenkel's diplococcus as the producer of hypopyon-keratitis and quoted Axenfeld, who observed metastatic panophthalmitis caused by it.

4. GRADENIGO (Padua) found a living larva of dermatobia noxialis (larger than that of the common fly) under the swollen eyelid of an infant.

IV. Session : Saturday, March 31st, 1:30 P.M.

President : H. DE GOUVEA (Rio de Janeiro).

1. ROHMER (Nancy) : *Infectious conjunctivitis, probably of animal origin.* Rohmer observed a chronic granular conjunctivitis with pannus in a farm-hand, not yielding to any treatment. On both sides of neck and in the armpits swollen glands. The bacteriological examination showed nothing characteristic (streptococci).

2. TAILOR (Naples) : *Incision of the iris angle in chronic glaucoma.* Tailor employed this operation, introduced by Prof. Vincentiis, for some time. He used a sickle-shaped knife, cutting with the convex edge fastened on a cylindrical handle, of such a diameter that the aqueous cannot escape when introduced into the anterior chamber. The puncture lies in the sclera 1.50 *mm* behind the limbus. The instrument is pushed to the opposite side, where the root of the iris is detached in a line of several *mm*. The idea is to free the angle of filtration.

BASSO found in some cases of glaucoma the iris angle obstructed, in others open, which is the rule in hydrophthalmus. Therefore, it is doubtful whether the obstruction of the iris angle can be considered as the cause of glaucoma, especially as experiments on animals furnish no proof.

SGROSSO (Naples) had excellent results with incision of the iris angle in a lady suffering from simple chronic glaucoma. Since childhood high myopia (in both) and within the last ten years a slow progressive deterioration of sight so that the patient had to give up her work. L V = $\frac{1}{\infty}$ before the operation. V F irregularly contracted T + 1. Glaucomatous excavation of disc, large staphyloma posticum extending to the macular region. Diffuse changes of the choroid, R V = $\frac{1}{9}\frac{1}{0}$. Posterior polar cataract. The incision of the iris angle with de Vincentiis, instrument was performed without difficulty. Decrease of tension L V = $\frac{1}{10}$ on the ninth day after the operation. The limits of the V F extended.

PFLUEGER believed that the peripheral iridectomy is easier and more effectual than the incision of the iris angle. Gallengo (Parma), Tailor, and de Vincentiis communicated clinical histories in favor of the latter. Pflueger dreaded a rupture of the zonula, as the instrument may not prevent entirely the escape of aqueous. This however is not the case according to those prac-

tising the operation. They considered the peripheral iridectomy to be difficult and emphasized the fact that, in eyes on which iridectomy had been performed, the iris angle often was found closed by the root of the iris, grown into the corneal wound, whereas the incision of the iris angle surely opens Fontana's canal.

GALENGO reported cases in which this operation had yielded good results, after iridectomy had been ineffectual.

3. GOLDZIEHER (Budapest). *On the pathology of retinitis proliferans.* The complex of symptoms called retinitis proliferans can be of different origin, and it is not generally true that it is due to retinal hemorrhages. The ophthalmoscopic image of this disease is chiefly observed in the course of syphilis and then it is perfectly curable. If developing from internal hemorrhages of the eyeball after injuries it is due to plastic chorioretinitis, and restitution is impossible. The third form develops spontaneously, independently of constitutional diseases, and consists in hyperplasia and hyaline degeneration of the membrana limitans interna of the retina. The discussion, in which Cohn, v. Mjllingen, Wicherkiewicz, Samelsohn, Landsberg, and Hirschberg took part, leads to the following conclusions: Retinitis proliferans proper (Manz) develops from hemorrhages of the retina and into the vitreous. It consists of the new formations of connective tissue and is incurable. A similar ophthalmoscopic image is furnished by a syphilitic alteration of the retina and vitreous, but differs in cause and anatomical constitution from retinitis proliferans (Manz). This latter form can be improved or cured by antisyphilitic treatment.

4. LAGRANGE (Bordeaux). *Advantages and disadvantages of the electrolysis in treating stenosis of the lachrymal passages.* Electrolysis may enhance the success of Bowman's method. Only weak currents are allowed for two to three minutes. Currents of more than six to eight milliampères produce scabs, leading to incurable strictures or complete closure of the lachrymal passages. Weak currents reduce the swelling of the mucous membrane, soon admitting of introducing thick probes.

V. Session: Monday, April 2d, 9 A.M.

President: ROTHMUND (Munich).

1. PFLUEGER (Berne) *treated high myopia with extraction* since three years, encouraged by Fukala's success. Two tables re-

ported over thirty cases operated on. Another series, of seventeen right and thirteen left eyes, was too recent for statistics. The thirty eyes belonged to twenty female and ten male persons from seven to forty years. The age within this limit was without marked influence upon the operation. The degree of myopia, varying from ten to twenty-two dioptries, was of great importance. Myopia, seventeen to twenty-two dioptries, has less primary V and less improvement by operation than lower degrees. The higher the degree of myopia, the greater generally the decrease of refraction by operation. The lowest limit for the operation for children is 10 D, for adults 12 D. Moderate hypermetropia is in all cases preferable to high myopia, even with the sacrifice of accommodation. Corrigible astigmatism from 0,5–3 D was determinable in twelve cases (25 %), three with inverted astigmatism. It was without influence on the vision. The refraction decreased by the operation in seventeen cases 14.50–16 D., in eight cases 17–18 D., in five cases 18.5–20 D. The exact prognosis of diminution of refraction cannot be made in an individual case, because :

(1.) The determination of refraction before the operation is not accurate on account of the different distance of the correcting glasses from the cornea.

(2.) The amount this cornea furnishes in the defective refraction differs very much.

(3.) Of the different depths of the anterior chamber.

(4.) Of the post-operative astigmatism.

V was improved in all cases, sometimes twice to three times as much, and remained so. Although fatal consequences have not been observed, it is more cautious to operate only on one eye. Discision with Bowman's needle is to be preferred to the lens-knife ; the vitreous must not be injured.

Discussion : VAN MILLINGEN saw detachment of the retina some years after discision of the transparent lens, and attributed it to the operation.

SCHMIDT-RIMPLER considered the dangers of the operation too great for the slight advantages of this little increase of V obtained by discision. The unilateral operation rendered binocular vision difficult or impossible. Wicherkiewicz preferred extraction to discision.

2. UHTHOFF (Marburg). *Anatomical contribution to embolism of the central retinal artery.* Two new post-mortem examina-

tions. In this first case, a man, æt. thirty-seven, the visual disturbance occurred about three years before death, with preservation of a very small central portion of V. F. The ophthalmoscope revealed the typical atrophy of the optic nerve due to arterial occlusion. Two small twigs showed a pretty good volume, all other branches of the central artery were very much narrowed. Some choroidal changes at the region of the posterior pole. The anatomical examination disclosed occlusion of the central artery within the optic tissue, perhaps from direct embolism produced by fragments of tumor (myoma of endocardium); on some other arteries this process is proven beyond doubt. Extensive atrophy of the retina and optic nerve; some parts of the former were almost entirely vanished. The second case was a girl, æt. twenty-seven, with heart disease. Thrombosis of the left caroti beyond the origin of the ophthalmic artery, with the typical ophthalmoscopic picture of recent embolism of the central retinal artery. Death about three days after the onset of the ocular affection. Anatomically marked degeneration of retina, especially at the region of the posterior pole, the optic nerve relatively intact. An obstruction of the central artery or of the more central branches of the ophthalmic artery could not be ascertained, so that in this case the obstruction of the ophthalmic artery at its origin from the caroti gave the picture of recent embolism of the central retinal artery on the same side. This case is the most recent ever examined anatomically.

VI. Session: Monday, April 2, 1:30 P.M.

President: PFLUEGER (Berne).

MARTINI (Rome): *Epithelioma of limbus cured by injections of sublimate.* A man, aet. seventy, noticed a small tumor at temporal limbus of his right eye for the first time three years ago. It gradually spread on the cornea, of which it covered about three *mm.* After removal speedy relapse, so that after two months it was larger than before. The microscopical examination of the removed tumor and a piece of the relapsed growth proved it to be epithelioma. Enucleation refused. As instillations of sublimate solution diminished the size of the tumor (as large as a dried olive), M. injected sublimate under the conjunctiva. A few days later he found the tumor transformed into detritus, which could be washed off by irrigation. After fourteen days a superficial

corneal ulcer was all that remained of the neoplasm and after two more weeks recovery was complete. A slight relapse after seven months called for two further injections. Recovery had remained uninterrupted ever since.

BACCHI (Pavia) considered sympathetic iridocyclitis as consequent to the chemical irritation of the ciliary nerves. He advocated enucleation.

VII. Session: Tuesday, April 3, 9 A.M.

President: LAGRANGE (Bordeaux).

1. GOUVEO (Rio de Janeiro): The central vision in a case of quinine amaurosis recovered almost completely ($\frac{6}{9}$ and $\frac{6}{8}$) after a duration of about two years. The visual fields remained concentrically contracted. The discs were white and the vessels could be traced only a short distance beyond the borders of the discs.

2. SCHMIDT-RIMPLER: *Binocular vision before and after squint operations.*

The views on the suppression of diplopia in concomitant strabismus still differ. Donders assumed a suppression, others think of an abnormal, new-formed identity of the retinæ. Against the latter much may be said: Quite a number of patients with strabismus, who at first deny diplopia, readily perceive it when a colored glass is used, in corresponding projection, also soon after the operation. It is not surprising that this projection does not always exactly correspond to the point where it belongs in normal identity of the retinæ, as the perception of muscular contraction required influences the projection. The fact that the same person always sees only one image, despite a variable degree of strabismus scarcely agrees with a new-formed identity of the retinæ; then the fixing eye, in alternating strabismus, always projects correctly, whereas, while deviating, the muscular image would have to be projected at another point in the space outside the eye. The following experiment may be tried, which often succeeds. While the fixing eye looks at a light, an object, *e. g.* a finger, is moved from the corresponding side so far until it covers the light. This disappears and the finger alone is seen. As the light is lastingly focused on the retina of the deviating eye on a point identical to the image of the finger, according to the above theory, now light and finger ought to be seen, or a struggle of images ought to arise. This, however, does not occur. The best explanation is

that only that image is seen for which the attention is aroused; the muscular image of course predominates. Schweigger mentions against the theory of suppression (Donders), that the squinting eye sees also, as may be proved by throwing light into it with the ophthalmoscope. This is correct. In some cases it can be demonstrated by means of the stereoscope, with the test card constructed by Schweigger, on which Javal's wafers are movable. The nasal hemiopia of the squinting eye can be exactly ascertained by this method. This hemiopia is also due to deficient attention; for instance, when Schweigger held a light (match) on the place, when the wafers disappeared, it was at once perceived. If the eye is separately tested on the perimeter the nasal hemiopia disappears—sometimes after repeated examinations. A deterioration of sight (central and excentric), however, is not denied in early development of monocular squint. The attention devoted to the fixed object prevents the perception of the false image. Wafers, *e. g.*, may be seen peripherally, but not the false image of a fixed light, even if thrown by a prism on the same point which perceives the image of the wafers. On the other hand, a red glass before the squinting eye gave the fixed true light a red hue. To lay the stress on the concentrated attention seems more correct than to speak of suppression of the false image by the squinting eye; the latter is no active process, only a consequence of the former. It is analogous to the monocular use of the microscope or ophthalmoscope, where we perceive all peripheral objects, especially those in motion, if we give them our attention. According to this interpretation of the manner of sight in squint, we are to give due importance to stereoscopic exercises after the operation. In certain cases a marked progress of binocular vision to its full amount can be observed. Often it takes this course.

(1.) Binocular diplopia.

(2.) Binocular monopia.

(3.) Solid stereoscopic vision.

(4.) Hering's experiment with falling bodies without mistake.

It is worth mentioning, how the different test-cards for binocular single vision, appearing almost equal, for instance, Burchardt's, are not equally united. This is even more marked in stereoscopic pictures, in which we have to contend with deception, arising from the assertion, of persons with only monocular vision, that they see the test pictures stereoscopically. The impression of relief even in monocular vision is often due to the convex glass of the stereoscope

Therefore pictures ought to be used, the details of which can only be exactly perceived by real stereoscopic vision. Geometrical figures are the best, but they are not always recognized by those who merely see stereoscopic pictures stereoscopically. Hering's experiment with falling bodies is the most difficult test. Schweigger made numerous such experiments, according to Greeff's arrangement, but from a part of his policlinic patients, on account of psychical weakness, correct statements could not be elicited. Even from 8–10 % of intelligent persons made mistakes, especially in regard to the bodies falling in front of the point of fixation. Considering this, only a small series of persons operated on for squint are able to stand this test, requiring a very high degree of stereoscopic vision; but I could ascertain it even with V $\frac{1}{3}$ in one eye. With such results stereoscopic exercises are heartily to be recommended. They obviate the muscular insufficiency (regularly to be met with after our operations for strabismus) by stimulating and strengthening the tendency to fusion.

3. MANFREDI (Pisa) reports Dr. Alfieri's *experiments on animals*, which show that chalazion is not a tuberculous affection.

PALERMO (Messina): The chalazion resembles very much tuberculosis of the conjunctiva, but is of different nature.

HAAB (Zurich) found bacilli in chalazion similar to those of tuberculosis, but distinguishable from them on closer examination.

VII. Session: Tuesday, April 3d, 1:30 P.M.

President: DUFOUR (Lausanne).

1. TYNER (Austin, Texas): *Preliminary capsulotomy in cataract extraction.* Tyner opens the capsule with the linear knife before performing counterpuncture.

2. HAAB: *The use of very strong magnets for removing pieces of iron from the interior of the eye.* (See *Trans. Heidelberg Ophthalmol. Soc.*, 1892.)

3. BONO: *The visual organ of epileptics.* (See this report 1893.)

IX. Session: Wednesday, April 4th, 9 A.M.

President: DE VINCENTIIS.

1. BOREL (Neuchâtel): *Traumatic hysteria of the eye* is much more frequent than is generally supposed. Erythropsia, hemi-erythropsia, spastic astigmatism, monocular diplopia, spastic strabis-

mus, nystagmus, mydriasis, epiphora with facial hemi-hyperidrosis, oculo-glosso-labial hemispasm may separately exist and form a monosymptomatic traumatic hysteria.

Traumatic ocular hysteria is very hard to cure, even in persons free from previous nervous affections, especially when setting in after accidents.

The hystero-traumatic strabismus is identical with the one artificially induced by hypnotic suggestion.

A slight traumatic hysteria of the eye may be the first sign of a subsequent general hysteria of long duration, even in a man in his best vigor. Perfectly insignificant injuries, not even troubling the patient at the time, may cause more than a year's disability by evoking hysteria. Borel saw, especially in men, loss of sexual appetite, general tremor, various contractures, anæsthesia of sensory nerves and special senses, insomnia, pain in the testicles, spasmogenetic zones, spasm of accommodation, mydriasis, and photophobia for a long time.

Hysterical copiopia by suggestion exhibits the following symptoms, classified according to intensity :

(a) Micropsia.

(b) Monocular diplopia with two colored pictures diverging more and more.

(c) Erythropsia or hemi-erythropsia.

(d) Amblyopia or total amaurosis.

(e) Epiphora or vasomotor paralysis of the vessels of the skin of the face.

(f) Facial hemi-hyperidrosis. Mydriasis with immobility of pupil might occur, but is not observed. Vasomotor paralysis of the inner tunics of the eye may also occur and present an organic affection, mostly in cases of hysterical ophthalmoplegia interior.

2. MOAURO (Naples) : *Determining the index of refraction with Javal's ophthalmometer.* This may be done by adding a concave mirror to it. Moauro fastens a hemispheric concave mirror of 7. 5 *mm* radius of curvature, on the anterior surface of the chin rest. A very thin plane-parallel plate of glass inserted into the margins of the hemispheric mirror admits of filling it with the fluid to be tested. The axis of the concave mirror must fall into the axis of the telescope of the ophthalmometer. With the formula $n = \frac{\text{sin. i}}{\text{sin. r}}$, n can be determined, *i. e.*, the angle of incidence can be found directly and unfailingly from the size of the image of the mires of the ophthalmometer, formed by the concave mirror.

The angle of refraction, r, is determined by the sliding of the mires, necessary to restitute the contact, after the concave mirror is filled with the fluid to be examined. Thus the method rests on the determination of the size of the images formed by the very same concave mirror, as it contains air or the fluid to be investigated. The size of the image is measured indirectly, *i. e.*, by ascertaining the variations in size of the objects, which is required to get images in both cases.

r is found from the figures registered by the ophthalmometer by means of a simple trigonometric calculation.

Comparative measurements with the ophthalmometer and prism have yielded identical results.

SYSTEMATIC REPORT ON THE PROGRESS OF OPHTHALMOLOGY DURING THE FOURTH QUARTER OF THE YEAR 1893.

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WITH THE CO-OPERATION OF

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Translated by Dr. Ward A. Holden.

Sections I.–V. Reviewed by Dr. S. BERNHEIMER.

I.—GENERAL OPHTHALMOLOGICAL LITERATURE.

TEXT-BOOKS, MONOGRAPHS, AND TREATISES ON GENERAL, BIBLIOGRAPHICAL, AND HISTORICAL SUBJECTS. STATISTICAL PAPERS.

259. Bock. The congenital colobomas of the eyeball. An anatomical and clinical study. Safar, Vienna, 1893.

260. Knapp, and others. Twenty-fourth annual report of the New York Ophthalmic and Aural Institute, 1893.

261. Howe. Legislation in the United States for the prevention of blindness. *Journ. Amer. Med. Assoc.*, Nov. 25, 1893.

In a book of two hundred pages, Bock (259) has given his own experience and that of others with respect to congenital coloboma of the eyeball, both from a clinical and an anatomical standpoint.

He has examined twenty-eight eyes with congenital coloboma. Ten of these were human, two having a coloboma of the macula, and six a coloboma of the lens. The eighteen others were pig's eyes with various colobomas. Besides these there were twenty-four cases of congenital coloboma examined clinically. A description of these cases occupies the first part of the book, in the second part is a systematic account of the peculiarities of various sorts of coloboma, and in the third part he endeavors to explain the genesis of these colobomas.

There were registered at the New York Ophthalmic and Aural Institute (260) in 1893, 6961 eye cases. Excluding the minor ones, there were 941 operations, and of these 146 were cataract extractions. There were 110 simple extractions, with 2 failures and 2 moderate results. There were 71 operations for trachoma with the roller-forceps. BURNETT.

HOWE (261) again recurs to the subject of preventable blindness, and besides going over the arguments in favor of legislation on the subject, records the fact that the States of New York, Maine, and Rhode Island have already passed laws regarding the cure of cases of ophthalmia neonatorum, and rendering the reporting of them obligatory. BURNETT.

II.—GENERAL PATHOLOGY, DIAGNOSIS, AND THERAPY.

262. GASPARRINI. The diplococcus of Fraenkel in ocular pathology. *Ann. di Ottalmol.*, xxii., 2–3, p. 131; and xxii., 4–5, p. 332.

263. GASPARRINI. On the micro-organisms of the conjunctiva in its normal state. *Ibid.*, xxii., 6, p. 488.

264. LAGRANGE. On the action of electrolysis on cultures of the staphylococcus and streptococcus. *Journ. de méd. de Bordeaux*, Aug., 1893.

265. GILLET DE GRANDMONT. Anophthalmus or cryptophthalmus. *Soc. d'opht. de Paris*, Oct., 1893.

266. GILLET DE GRANDMONT. Anophthalmus or cryptophthalmus, a study in comparative anatomy. *Arch. d'opht.*, xiii., 12, p. 742.

267. ELSCHNIG. On the influence of stoppage of the ophthalmic artery and the carotid on the organ of vision. *Graefe's Archiv*, B. ix., 4, p. 151.

268. BOAS. Experimental anatomical investigations on the

influence of tuberculocidin and tuberculin on experimental tuberculosis in the eye of the rabbit. *Ibid.*, p. 178.

269. COLLINS. Microphthalmus. *Trans. Ophth. Soc. Un. K.*, xiii., p. 114.

270. RANDOLPH. A case of panophthalmitis caused by the bacillus coli communis. *Amer. Journ. Med. Sci.*, Oct., 1893.

271. DE SCHWEINITZ. Intra-ocular injections of solutions of various antiseptic substances. An experimental inquiry. *Journ. Amer. Med. Assoc.*, Oct. 31, 1893.

272. RISLEY. Panophthalmitis—fatal meningitis following enucleation of the eye. *Ibid.*, Nov. 12, 1893.

GASPARRINI (262) describes the results of his investigations in regard to the diplococcus of Fraenkel. Three-day-old cultures were injected under the conjunctiva, into the cornea, anterior chamber, and vitreous, producing violent inflammatory symptoms like those produced by injections of the most virulent pyogenic bacteria. Six-day-old cultures caused only a transient irritation. These results induced the author to examine twenty-five clinical cases of hypopyon keratitis. In six cases agar cultures showed only the diplococcus of Fraenkel, and subcutaneous injection of the cultures killed rabbits. In eight cases there were impure cultures, the diplococcus being found together with the staphylococcus. These cultures also killed rabbits. In nine other cases impure cultures were obtained which did not kill rabbits. Only three cultures were negative. Similar results were obtained from the pus of panophthalmitis. DANTONE.

Later GASPARRINI (263) made bacteriological examinations of the conjunctiva of 100 eyes, and found the diplococcus of Fraenkel 8 times in 10, the staphylococcus aureus 6 times, the staphylococcus albus 5 times in 10, and the streptococcus 15 times in 100. The staphylococcus citreus is still rarer. Other bacteria were not taken into account, as having but limited pathogenic properties. DANTONE.

The employment of electrolysis in the treatment of dacryo-cystitis led LAGRANGE (264) to try the effect of the constant current on the producers of the disease, and he found that it possessed marked microbicidic properties. Cultures were not made sterile, but were rendered less virulent. He ascribes this action of electrolysis to the chemical products of the decomposition. The bubbling produced in electrolysis of the tear sac, would seem to indicate that the products are chiefly gaseous. SULZER.

GILLET DE GRANDMONT (265 and 266) described the conditions found in a pheasant, which was born apparently without eyes. There was no trace of lids or palpebral fissure. The skin of the ocular region was adherent to the bone through the medium of fine cellular tissue. The orbit was completely wanting, and in its place, between skin and bone, there was fibrous tissue enveloping a body the size of a pinhead, which showed all the elements of a normal eye, with muscles and optic nerve. The author therefore believes that the cases described as anophthalmus are properly cases of cryptophthalmus. v. MITTELSTÄDT.

ELSCHNIG (267) studied two cases, and made some experiments for the purpose of determining what influence the stoppage of the ophthalmic artery and the carotid has on the eye. A gradual stoppage, as in thrombosis of the ophthalmic, internal carotid, or common carotid, will cause no disturbance of circulation in the orbit. A sudden stoppage will cause transient disturbances in circulation, without anatomical lesion, since the width of the vascular connections between the twigs of the ophthalmic artery and the external carotid of each side permits a speedy restoration of normal vascular tension.

BOAS (268) made a number of experiments on rabbits with tuberculin and tuberculocidin. Neither arrested the progress of the disease, and the course was the same when either of the two was injected. The number of tubercle bacilli appeared to be greater in the animals injected than in those not injected, and there were no signs of their destruction.

COLLINS (269) describes the microscopic appearance of three microphthalmic eyes. In one case both eyes were examined, and showed a bulging of the sclera below the optic nerve. In the left eye there was a coloboma of the iris; the lens was drawn back into the vitreous by a connective-tissue band, which could be followed to the posterior pole of the ball.

The second case was one of rudimentary eyeball, with a lobulated cyst. The cavity of the cyst communicated by a narrow channel with the interior of the eye, and was filled with folded retina. In the region of the bulging traces of choroid were found, and uveal pigment could be followed a short distance. No signs of inflammation were visible. Collins accepts Kundrat's explanation of such cases. WERNER.

The panophthalmitis in RANDOLPH'S (270) case was the result of an injury, and the eye was removed. Examination of the in-

flammatory products and inoculation of the eyes of rabbits and dogs showed that the common bacillus of the colon was the pathogenic cause. BURNETT.

DE SCHWEINITZ (271) has made a large number of experiments on animals with the view of determining the effects of intra-ocular injections, both on normal and diseased eyes. These he has given in full details, and the results at which he has arrived are that the choroid, vitreous, and retina withstand antiseptic injections badly, and that in rabbits at least they have little power of preventing or arresting pathological processes, and if they are employed they should be in small doses not exceeding two minims. BURNETT.

RISLEY'S (272) patient was a man in feeble health, whose eye trouble began with an iritis, but after quite a long while terminated in a panophthalmitis, for which the eye was enucleated. The healing was slow but kindly, and it was only twenty-one days after the operation that symptoms of meningitis set in, from which he finally died. No autopsy was obtained, and the examination of the excised eye showed only the ordinary conditions of panophthalmitis. BURNETT.

III.—INSTRUMENTS AND REMEDIES.

273. MARTELLI. On scopolaminum. *Arch. di Ottal.*, i., 1–2, p. 63.

274. DANESI. A guide in the administration of chloroform. *Boll. d'Ocul.*, xv., 18–19–20–21.

275. SGROSSO and SCALINCI. Injections of sublimate beneath the conjunctiva and the capsule of Tenon in the treatment of some ocular affections. *Ann. di Ottalm.*, xxii., 6, p. 507.

276. SIMI. On posterior sclerotomy. *Boll. d'Ocul.*, xv., 14.

277. GAUTHIER. The means of rendering cocaine anæsthesia uninjurious. *Rev. génér. de clinique et de therapeutique*, 1893, p. 587.

278. BRAQUEHAYE. On the employment of the oil of biniodide of mercury as an antiseptic in certain ocular affections.

279. LANDOLT. An ophthalmotrope. *Arch. d'opht.*, xiii., p. 721.

280. ROMANO. On toric lenses. *Arch. d'Ottal.*, i., 1–2, p. 60.

281. TSCHERNING. Aberroscope. *Arch. d'opht.*, xiii., 10, p. 615.

282. JACKSON. The best method of testing with cylindrical and variable prismatic glasses by means of a new phorometer. *Jour. Amer. Med. Ass.*, Nov., 1893.

283. JACKSON. The tests for heterophoria and their comparative value. *Med. News*, Oct., 1893.

284. FRANKE. Investigations on the disinfection of the conjunctival sac, with remarks on its bacteriology. *Graefe's Arch.*, xxxix., 3, p. 1.

285. WOLF. A new disc-sciascope with automatic mirror. *Zehender's klin. Monatsbl.*, xxxi., p. 439.

286. BAKER. Cocaine poisoning. Report of a case with alarming symptoms. *Am. Jour. of Ophth.*, Nov. 1893.

287. VEASEY. Tropo-cocaine. *N. Y. Med. Jour.*, Nov. 25, 1893.

288. HERN. The treatment of cases of simple photophobia by the constant current. *Trans. Ophth. Soc. Un. K.*, xiii., p. 235.

MARTELLI (273) has experimented for months with scopolamin and believes it to be a powerful rival of atropine. The mydriasis and paralysis of accommodation are as great as when atropine is used, but are more transient. It does not cause toxic symptoms or increased tension. The author uses a 1:1000 solution.

DANTONE.

According to DANESI (274) the pupillary reaction is the safest guide in the administration of chloroform, although this is denied by many authorities. Miosis denotes complete and safe anæsthesia, marked mydriasis beginning danger of death. With this marked mydriasis one should not confuse the moderate mydriasis, called by Danesi reaction-mydriasis, which comes with awakening, or with operative procedures when the narcosis is suspended. This latter is frequently observed in topers and nervous individuals. DANTONE.

SGROSSO and SCALINCI (275) report their extensive experiments with subconjunctival and subtenonine injections of sublimate in corneal ulcers, syphilitic affections, and sympathetic ophthalmia. Sublimate was found in the aqueous humor and cornea as late as the third day. Attempts to discover the process of healing in corneal ulcers, by producing septic ulcers in rabbits, treating them with injections, enucleating the eye in the course of recovery, and examining them microscopically, gave no definite results, the authors not being able to determine whether the healing was

brought about by the proliferation of the fixed corpuscles or by the continued transformation of round cells. DANTONE.

In a case of adherent prolapse of the iris with the sudden development of glaucoma, SIMI (276) obtained immediate relief by making an equatorial puncture. The anterior chamber was partially restored, permitting an iridectomy. DANTONE.

In order to neutralize the constricting effect of cocaine on the vessels when injected subcutaneously, GAUTHIER (277) combines it with trinitrin as follows:

Cocain. mur.	0.20
Aq. dest.	10.00
Adde	
Solutio. alcoholic. triniti $\frac{1}{100}$	gtt x.

In this combination he frequently injected 0.10–0.12 cocaine, obtaining its anæsthetic effect, without any other unpleasant action. SULZER.

BRAQUEHAYE (278) found an oil containing biniodide of mercury 4:1000 to be an excellent remedy for parasitic affections of the lid margins, and for neglected traumatic ulcers of the cornea. v. MITTLESTÄDT.

LANDOLT'S (279) ophthalmotrope consists of a schematic eye, represented by the vertical and horizontal meridians, the equator, the three axes, and the cornea. It is useful in studying and demonstrating the normal motions of the eye, and gives in a simple manner the position of the double images, the faulty projection, and the position of the eye in muscular paralysis. v. MITTLESTÄDT.

TSCHERNING'S (281) aberroscope serves to demonstrate the presence of irregular astigmatism, which often causes the diagnosis of amblyopia to be made. The instrument consists of a plano-convex lens of 4 in., on the plane surface of which are ruled two systems of parallel lines crossing each other at right angles. When a distant light is looked at through this lens, these crossing lines are perceived as shadows in the dispersion image of the light, and if the cornea covering the pupil is normally curved the lines appear in their correct position. When the curvature of the cornea increases toward the periphery, the lines appear convex, and when the curvature decreases the lines appear concave toward the centre. Thus one may determine whether a corrigible or an irregular astigmatism exists. v. MITTELSTÄDT.

JACKSON'S (282) instrument consists of a Maddox rod of ten

mm radius and 10 *mm* long ground on a stationary prism. The other prism is a revolving one, and the arrangements of the mechanism are such that the variable prismatic actions of the revolving prism are easily seen. This can also be used for the near test, by employing a small dot as the test object.

JACKSON (283) believes the direction of the eye under cover the best objective test and relies on it much in determining heterophoria. Of the subjective tests he prefers the rod of Maddox and the red glass. He also uses a strong cylinder (12 D) for the near dot test. BURNETT.

FRANKE (284) has experimented on disinfection of the conjunctival sac with simple washings with bichloride 1:5000; the same after previous wiping; washing with chlorine water (Schmidt-Rimpler); brushing with bichloride 1:2500, and washing with trichloride of iodine 1:2000 (Pflueger).

His conclusions are as follows: (1) A conjunctiva normal in appearance may contain micro-organisms, and even such of a pathogenic nature. (2) The conjunctiva should, therefore, always be disinfected before an operation. The disadvantage of bichloride in causing parenchymatous opacity of the cornea is counterbalanced by the quick decomposition and loss of disinfecting power, and the smell of other agents. (3) None of these agents will sterilize the conjunctival sac with certainty. In 24 % of cases the number of micro-organisms was apparently reduced. (4) Since the agents act only on those micro-organisms on the surface of the epithelium, it is advisable to first wipe out the sac with agents which dissolve the mucus. The use of indifferent agents, salt, boric-acid solution, and the like, is not advisable. (5) Micro-organisms which are not killed by disinfection, do not lose thereby their virulency.

After using a few drops of a 6 % solution of cocaine, preparatory to slitting up the canaliculus of a woman, BAKER (286) found his patient talking incoherently, and soon began to have convulsions and passed into unconsciousness. The face was flushed, pulse irregular, varying from 120 to 50, but not weak; convulsions lasted for more than two hours. Passing from the unconscious state she became wildly delirious, but there was no very apparent erotic tendency. The next day she was quite well again, aside from a slight headache. He gives in addition a tabulation of ten cases of death after the use of the drug, gathered from various sources. BURNETT.

The advantages which VEASEY (287) has found for tropococaine are its limited action on the pupil and accommodation, and its less tendency to produce ischæmia. BURNETT.

IV.—ANATOMY.

289. HENSCHEN. The anatomy of the visual tract from a diagnostic standpoint. *Upsula Läkareforening Förhandl.*, xxix., 1-2, p. 83.

According to HENSCHEN (289) the visual tract, or the path that runs from the eyeballs to the visual centre in the calcarine fissure, consists of two portions. The frontal portion is formed by the large ganglion cells of the retina and the nerve fibres that pass backward from these, making up the optic nerve, chiasm, and tract, and ending in the corpora geniculata externa. The posterior portion of the visual tract is formed by the ganglion cells in the corpora geniculata and the fibres that pass backward from these and end in the cortical visual centre. The optic nerve consists of crossed, direct, and macular fibres. The macular bundle, which is latero-ventral in the papilla, becomes central farther back, and runs so in the chiasm and tract.

The external geniculate ganglion is the most important visual ganglion. The optic-nerve fibres enter also the pulvinar and the anterior corpora quadrigemina, but these fibres appear not to conduct visual impressions directly, and their destruction seems to cause no defect in the visual field. In the cells of the geniculate ganglion the fibres of the so-called occipital visual tract have their origin. These fibres form a bundle 5 *mm* thick, lying at the level of the second temporal convolution, and pass backward toward the bottom of the calcarine fissure. Here, as in the frontal visual tract, the fibres for the dorsal half of the retina lie upward. From this bundle arched bundles of fibres run in the occipital lobe to the bottom of the calcarine fissure and its branches, where the visual centre is located, near the cortical layer, destruction of which produces complete hemianopsia. The upper branch represents the upper half of the retina, the lower lip the lower half. Probably the macular portion lies at the bottom of the fissure more frontally, and the peripheric retinal field more occipitally. The macular field of the retina has often a double supply from the two halves of the brain. The elements of the crossed and direct fibres lie quite close together in the cortex. The visual centre perceives both light and color impres-

sions. The visual tract does not take part in the formation of the internal capsule, nor is there one crossing behind the chiasm, as Charcot thought, or several, as Grasser stated. SCHIÖTZ.

V.—PHYSIOLOGY.

290. BARDELLI. Sciascopy. *Ann. di Ottalm.*, xxii., 2–3, p. 171.

291. BAQUIS. On the entoptic phenomenon of Heuse. Critical points and a new interpretation. *Ibid.*, xxii., p. 471.

292. BRISSAUD. The visual function and the cuneus. *Ann. d'Ocul.*, cx., p. 321.

293. VIALET. The cerebral visual centres and the intracerebral nervous apparatus. *Thèse de Paris*, 1893, v., 365.

294. DE BONO. On the location of the cortical centre for the elevation of the upper lid. *Arch. di Ottalm.*, i., 1–4, p. 36.

295. SPOLITTA and CONSIGLIO. Researches on the constrictor nerves of the pupil. *Arch. di Ottalm.*, i., 1–2, p. 18.

296. JAVAL. Report on the stereotomic model of the surface of Sturm. *Soc. d'opht. de Paris*, Nov. 7, 1893.

297. MAYS. On the ferric component of fuscine. *Graefe's Archiv*, xxxix., 3, p. 89.

298. ROMMEL. On the anæsthetic effect on the eye of some heart poisons. *Ibid.*, p. 96.

299. SACHS. An objective method of testing the color sense. *Ibid.*, p. 108.

300. SCHMIEDT. On the relative fusion breadth with elevation and depression of the visual plane. *Ibid.*, p. 233.

301. BERRY. On the relation between visual acuity and visual efficiency. *Trans. Ophth. Soc. Un. K.*, xiii., p. 208.

302. BERRY. The innervation of the oculomotor muscles. *Ophth. Rev.*, xii., p. 285.

BARDELLI (290) gives a detailed description, with notes by Guaito, of the theory and employment of the shadow test.

DANTONE.

In order to avoid repetition, the papers of BRISSAUD (292) and VIALET (293) may be noticed together. The latter studied five cases of cortical hemianopsia and cortical blindness by means of serial sections, and came to the following conclusions : The least

extensive cortical lesions capable of producing hemianopsia are located on the inner surface of the occipital lobe, and include the region of the calcarine fissure. There is no record based on careful microscopic examination of the occurrence of cortical blindness in consequence of a pure cortical lesion of the convexity.

The cortical visual centre occupies the entire area of the inner surface of the occipital lobe. Anteriorly it is bounded by the internal perpendicular fissure, superiorly by the margin of the hemisphere, posteriorly by the apex of the temporal lobe. The cortical centre thus occupies the region which we have found by anatomical investigation to be characterized by the presence of Vicq-d'Azyr's band. The calcarine fissure is of great importance, forming the middle point of the cortical visual centre in man.

Brissaud believes that the region given by Vialet is too large. He assumes that the lingual and fusiform lobules contain the visual centre, and in the entire longitudinal extent from the occipital pole forward. Since the calcarine fissure, the "middle point of the visual sphere," according to Vialet, often extends out on the outer surface of the occipital lobe, a focus producing cortical blindness may be located partially in the convexity. Many observations seem to confirm this view. In order to prove it Brissaud considers the course and central termination of Gratiolet optic radiation. The fibres of the optic radiation are, up to the immediate neighborhood of the apex of the occipital lobe, separated from the convolutions of the inner surface of the occipital lobe by the occipital nucleus of the lateral ventricle and by the tapetum. No direct communication can exist therefore between the fibres of the radiation and the cuneus. Careful microscopic examination of this portion of the brain shows moreover that the cortex of the cuneus is separated from the sensory bundles by a layer of vertical fibres. Brissaud draws the following conclusions: The sensory bundles of the optic radiation are the most sharply bounded bundles of the entire centrum ovale. They are inserted into the whole lower half of the lingual lobule, from its posterior end to the cuneus hippocampi. They also end in part in the fusiform lobule and perhaps in the third temporo-occipital convolution. The cuneus sends no true projection fibres to the nuclei of the optic nerve, or, if such be present, they are so few in number that their destruction alone cannot produce hemianopsia. If lesions of the cuneus can cause cortical blind-

ness, this must be produced in a way other than that commonly assumed, *i. e.*, there cannot be an interruption of cortical visual ganglion fibres. SULZER.

DE BONO (294) had the good fortune to discover the cortical centre for the elevation of the upper lid. Grasset and Landouzy supposed this to be located in the gyrus angularis, but later observations show this idea to be incorrect. The careful study of two cases of ptosis, one congenital and the other of four years' duration, led him to discover the true location. The two young women who suffered from ptosis had no symptoms to explain this isolated paralysis other than occasional epileptiform convulsions, which began in the arms and often affected also the lower extremities and the muscles of the face. As it is known that the psychic centre for the muscles of the arm and face lies in the ascending parietal convolution, De Bono was led to examine the corresponding part of the skull. The patient who had suffered from ptosis from birth showed a depression as broad as the finger on the zygomo-Rolandic line of Le Fort, 93 *mm* from the external auditory meatus, and 102 *mm* from the orbital margin. The patient, who was unaware of the depression, could not remember any injury, but had heard her mother say that her birth had been difficult. It was therefore concluded that the injury had occurred at birth and that it was the cause of the ptosis. A study of a head of similar size showed the author that the depression corresponded to the central convolution at the junction of the lower two-fifths with the upper three-fifths. Experiments on living dogs confirmed this observation. He therefore makes the following statements: (1) There is in the cerebral cortex a special zone for the elevation of the lid of the opposite side. (2) This zone must lie in the central convolution, near its centre and nearer the fissure of Rolando, *i. e.*, in front of the centre for the arm and above the centre for the face. DANTONE.

SPOLITTA and CONSIGLIO (295) have found constantly that irritation of the oculomotor nerve with a weak electric current at its apparent origin, produces a slight contraction of the pupil, but that the miosis is much greater when the current acts on the nerve proper after the sympathetic and 5th-nerve bundles have joined the oculomotor. The extirpation of the upper cervical sympathetic ganglion does not affect the experiment, from which the author concludes that the miosis is caused by the irritation of the 5th nerve, and he speaks of the symptoms following section of

the second branch. The contraction of the pupil occurs indirectly through the vasomotor action on the part of the trigeminus.

DANTONE.

MAYS (297) examined the brown pigment of the retina, called fuscine by Kühne, and found that it contained iron.

SACHS (299) had previously shown that the power of excitation of a light on the centre governing the reflex movement of the iris depended upon the apparent brightness of the light. Two lights of different quality but equal luminous intensity have an equal motor value. Since colored lights have for the color-blind luminous values different from those that they have for individuals with normal vision, he thought that color disturbances might be objectively determined by the pupillary reaction, and this supposition he found to be true.

SCHMIEDT (300), at Sattler's suggestion, examined the relative fusion breadth in elevation and depression of the visual plane by means of Hering's haploscope, with the following results:

1. The extent of fusion with elevation of the visual plane is at times the same as that with horizontal or depressed visual planes, but for the most part there is greater diverging power and less converging power.

2. The position of the fusion field is dependent upon the position of balance of the eyes.

BERRY (302) begins by pointing out the fallacy of the terms "secondary contracture" and insufficiency of the "internal recti." He then considers the nature of the innervation of the internal and external recti. He denies the existence of any diverging impulse, for instance practice does not increase the power of divergence beyond the amount of deviation produced by excluding an eye. There is only a relaxation of the converging impulse. When the eye is rotated in any direction, the movement is regulated by the stretching of a contracted antagonist without any additional innervation, this accounts for the complete concomitancy of an ordinary strabismus. Lateral movements also take place, not alone by an impulse to move to the left for instance, but also by an initial relaxation of the antagonist due to withdrawal of impulse to associated right rotation.

WERNER.

Sections VI.–XI. Reviewed by DR. HORSTMANN.

VI.—ANOMALIES OF REFRACTION AND ACCOMMODATION.

303. FICK. On a new method of determining refraction in the inverted image. *Deutsche med. Wochenschr.*, 1894, No. 44.

304. CASPAR. Further cases of ophthalmoscopically visible ectasia at the posterior pole. *Arch. f. Augenh.*, xxviii., p. 75. Three cases of Weiss's reflex line.

305. GUILLOZ. On the existence of an accommodative lenticular astigmatism. *Arch. d'opht.*, xiii., 10, p. 676.

306. RANDALL. The curvilinear reflection of Weiss as a prodromal sign of myopic distension. *Jour. Am. Med. Asso.*, Oct. 28, 1893.

FICK's (303) procedure depends upon the determination of the location of the inverted image, a cross of threads being carried nearer to the large lens until with movements of the observer's head the crossed threads and the image of the fundus make equal excursions.

GUILLOZ (305) repeated the experiments of Dabrowalski and others in regard to the influence of cylindrical lenses on the acuteness of vision in normal eyes. In two medical students with normal vision this remained unchanged when − 2. D cyl. or + 1.5 D cyl. was placed before the eye of one, and when − 3.5 D cyl. or + 1.5 Dcyl. was placed before the eye of the other. Stronger glasses diminished the acuteness of vision. After the use of atropine no cylindrical glass could be overcome; after the use of cocaine this power was only slightly diminished. In order to prevent error, the eyelids were held wide apart, and a diaphragm with an opening the size of the pupil was held before the eyes with mydriasis. From these experiments he concludes that there is astigmatic accommodation, but he leaves it undetermined whether it be produced by change in the curvature of the lens or by tilting. V. MITTLESTÄDT.

RANDALL (306) has investigated the curved reflex of Weiss and concludes from his observations that the presence of this retinal reflex is at least ground for giving a guarded prognosis, and demands regular periodical examinations of the vision. BURNETT.

VII.—LIDS.

307. KÖHLMOOS. On chalazion. *Inaug. Dissert.*, Giessen, 1893.

308. VIERLING. On Fukala's operation for ectropium of the lower lid. *Beitr. z. Augenheilk.*, ix., p. 42.

309. HESS. On the operative treatment of ptosis. *Arch. f. Augenheilk.*, xxviii., p. 22.

310. ROMANO-CATANIA. A new plastic process for covering the orbital cavity after exenteration. *Arch. di Ottalm.*, i., 6, p. 209, and *Boll. d'Ocul.*, xv., 21.

311. FUCHS. Association of movement of the lids with lateral movement of the eye. *Beitr. z. Augenheilk*, xi., p. 12.

312. SCOTT. A departure in the operation of canthoplasty. *Ophth. Review*, xii., p. 293.

313. BATES. Report of a case of plastic operation for the restoration of the inner angle of the eye. *Annal. of Ophth. and Otol.*, July, 1893.

KÖHLMOOS (307) examined microscopically sixteen cases of chalazion. First there is an inflammation in the neighborhood of the Meibomian glands, then changes in the glands and in the tarsus. The mass of the chalazion consists of granulation tissue, in which giant-cells are found. It cannot be considered a tuberculous tumor, and it is probably not caused by micro-organisms.

VIERLING (308) commends Fukala's operative method for ectropium of the lower lid, since in it the tubular cicatrix made by Snellen's suture becomes a broad cicatrix involving the entire breadth of the lower lid, retaining it permanently in its new position.

According to ROMANO-CATANIA (310), in cases where extirpation of malignant neoplasms of the orbit necessitates removal of the lids, Angelucci closes the orbit with two thick flaps drawn from the forehead and the cheek and united with sutures, so that the eyebrow comes in the previous position of the palpebral fissure. The thickness of the flaps prevents much sinking and the eyebrow simulates the appearance of the lashes of a closed eye. In three cases operated in this manner, the author obtained a relatively satisfactory result, as is shown by the photographic representations given. DANTONE.

FUCHS (311) reports five cases in which adduction of the eye was accompanied by an elevation of the paretic upper lid.

In order to prevent tearing of the conjunctiva and union of the cut surfaces after canthoplasty, SCOTT (312) dissects up a flap of conjunctiva nearly as far as the cornea, which is sutured into apex of cut at outer canthus. The upper lid margin is kept slightly everted by a vertical piece of silver wire run through the lid and acting as a splint. WERNER.

In BATES's (313) case the inner angle of the right eye was removed as far as the middle of the lower lid for an epithelioma.

The defect was covered with a quadrilateral flap, which was taken from the middle of the forehead above the root of the nose, divided and brought down, one portion joining the upper lid, the other the lower. The flap soon attached, and nineteen months later there had been but little shrinking. BURNETT.

VIII.—LACHRYMAL APPARATUS.

314. DENTI. The rapid treatment of dacryocystitis. *Boll. d. Poliambulanza Ann.*, 1893.

315. GUAITA. More observations on his operative procedure for the rapid cure of dacryocystitis. *Ann. di Ottalm.*, xxii., 2-3, p. 135.

316. DEBIERRE. A case of symmetrical tumefaction of the lachrymal and parotid glands. *Rév. génér. d'opht.*, 1893, No. 10, p. 433.

317. LAWFORD and COLLINS. Two cases of sarcoma of the lachrymal gland. *Ophth. Hosp. Rep.*, xiii., p. 395.

DENTI (314) is an advocate of destruction of the lachrymal sac in cases of tedious purulent inflammation and dilatation, and particularly where there is caries of the bony wall of the canal. He splits the sac open in its entire length, scrapes out all diseased tissue with a spoon, and closes the incision with sutures, usually obtaining primary union. DANTONE.

GUAITA (315) reports that he has now operated on about one hundred cases by scraping the sac, dilating the canal, and introducing a decalcined bony canula. The canal has remained pervious except in a few cases, where the bony canula was too small. DANTONE.

DEBIERRE'S (316) patient, a man of twenty-seven, otherwise healthy, showed a slowly developing painless swelling of both lachrymal and parotid g'ands. The lymphatics were not involved. Mixed treatment gradually reduced the size of the swellings. SULZER.

IX.—MUSCLES AND NERVES.

318. DARQUIER. On certain recurring paralyses of the sixth pair (migraine ophtalmique of Charcot). *Ann. d'Ocul.*, cx., p. 257.

319. BARD. A distinguishing characteristic between congenital nystagmus and that due to disseminate sclerosis. *Lyon méd.*, 1893, 26.

320. GOULD. Exophoria curable without operation. *Med. News*, Oct. 14, 1893.

321. FRIEDENWALD. Post-diphtheritic paralysis of both external recti muscles. *Ibid.*, Oct. 21, 1893.

322. SCHAPRINGER. Retro-pharyngeal abscess in an infant, followed by paralysis of the ocular branches of the sympathetic nerve of one side. *Amer. Journ. of Ophth.*, Oct., 1893.

323. MURRELL. Some practical experiences with muscular anomalies. *Journ. Amer. Med. Assoc.*, Oct. 28, 1893.

324. GOULD. An additional word as to the treatment of exophoria. *Med. News*, Nov. 18, 1893.

325. GUNN, D. Congenital ophthalmoplegia in two brothers. *Trans. Ophth. Soc. Un. K.*, xiii., p. 150.

326. SNELL. Two cases of recurrent third-nerve palsy associated with migraine. *Ibid.*, xiii., p. 110.

DARQUIER (318) finds in the literature twenty-seven cases of recurrent oculomotor paralysis, the biography of which he gives. His own typical case was right-sided, and was characterized by a concomitant facial and hypoglossal paralysis. SULZER.

According to BARD'S (319) observation, when a patient with nystagmus from disseminate sclerosis fixes an object in an extreme lateral position, the oscillation becomes more marked; in patients with congenital nystagmus the oscillation disappears for some seconds when the eye is turned in an extreme lateral position. SULZER.

GOULD (320) lays down the proposition that every case of exophoria is certainly and quickly curable by a rational and common method of ocular gymnastics of a certain kind and absolutely without operation. He claims also that with certain modifications the method is applicable to all forms of heterophoria. The essence of his method, which he elaborates in detail, is the exercise of the weak muscles with prisms base out for a period of five minutes two or three times a day. He gives the histories of fourteen cases which he has successfully treated in this way. BURNETT.

In the case reported by FRIEDENWALD (321) the paralysis of both external recti came on three weeks after an attack of diphtheria of considerable severity. In sixteen days the trouble had disappeared. BURNETT.

In SCHAPRINGER'S (312) case a child of nine months showed a

miosis of the right eye, and the palpebral aperture on that side was only one half the size of the other. There was no enophthalmus or sinking of the eye in the orbit. Both pupils responded to light. The only cause that could be assigned was a retro-pharyngeal abscess which had appeared when the infant was six months old, and which had been repeatedly incised through the mouth. BURNETT.

MURRELL (323) considers the practice of tenotomy advisable in cases of muscular insufficiencies, and relates the histories of four cases in which the procedure was a success, and one in which, in spite of a number of operations and other treatment, there still seemed to be an antipathy to single vision. He regards the Maddox rod as the best single test for heterophoria. BURNETT.

GOULD (324) thinks that with few exceptions heterophoria and especially exophoria are central and inner, rational in their origin, and do not depend upon deficiencies of muscular strength, and that therefore operative interference on the tendons is rarely called for. A system of muscular gymnastics with prisms he considers the proper treatment, and he lays down in detail the rules by which he employs it. This consists essentially in the employment of prisms which do not give a constant strain but a rhythmical action for a limited time. BURNETT.

SNELL'S (326) first patient, a man aged twenty-seven, suffered from sick headaches since the age of ten. When aged twenty the left lid began to droop with each attack. When seen there was some paralysis of the third nerve which appeared to be permanent. In the second case, a girl aged twenty, the attacks were fewer and at considerable intervals. Both cases are as usual monocular. The girl recovered completely. WERNER.

X.—ORBIT AND ACCESSORY CAVITIES.

327. FAGE. Orbital cellulitis and palpebral abscess of dental origin. *Soc. d'opht. de Paris*, Nov. 7, 1893.

328. LE MOND. Exostosis of the orbit. *Jour. Amer. Med. Assoc.*, 1893, p. 205.

329. LAGRANGE. Primary melanotic tumors of the orbit. *Arch. clin de Bordeaux*, Sept., 1893.

330. DE LAPERSONNE. Fronto-orbital dermoid cyst. *Arch. d'opht.*, xiii., 11, p. 657.

331. STIRLING. On primary sarcoma of the orbit, with notes on 29 cases. *Ophth. Hosp. Rep.*, xiii., p. 529.

332. OTTO. On cryptophthalmus. *Wiener klin. Wochenschr.*, 1893, No. 49.

333. BECKER, H. Microphthalmus with orbito-palpebral cyst. *Arch. f. Augenheilk.*, xxviii., p. 81.

After giving some general considerations on exostosis of the orbit, LE MOND (328) relates the history of a case of a man aged twenty-four, in whose right orbit there developed a tumor, springing from the lower edge of the orbit and extending backward. The exophthalmus was upward and outward. Vision was $\frac{7}{20}$, but there was diplopia. The tumor was cut away piecemeal with chisels, gouges, and drills, and no attempt was made to enucleate it at its base. The patient made a good recovery, with a disappearance of all the unpleasant symptoms. BURNETT.

From LAGRANGE'S (329) comprehensive description we shall only call attention to two points: first, the relatively benign character of the pigmented tumors of the orbit, which are often erroneously confused with sarcoma of the uveal tract in regard to prognosis; and second, the difference in nature of these neoplasms from melanotic sarcomata. Like Vossius and Birnbacher, Lagrange finds the pigment to be hematogenous.

LAPERSONNE'S (330) patient was a boy of eighteen, who had noticed three years before a slight bulging of the forehead above the left brow. The tumor grew slowly, extending beneath the brow, involving the lid and entering the orbit, displacing the eyeball downward and forward. Lapersonne found that the tumor could be pushed back into the orbit, and when it was removed the inner plate of the roof of the orbit was entirely wanting, and the cavity communicated with the frontal sinus. The contents of the cystic tumor were similar to those usually found in dermoid cysts. After a second operation, in which the bony margins of the cavity were removed, a good result was obtained, with preservation of the normal function of the eye. Lapersonne believed that the cyst developed from the anterior table of the frontal bone, pushing the two tables apart, and after perforating the outer, entered the orbit and frontal sinus.

V. MITTELSTADT.

STIRLING (331) reported on 29 cases of primary sarcoma of the orbit, 14 in males and 15 in females, between the ages of twenty-eight and seventy-five. In 17 cases there was recurrence.

OTTO (332) observed a case of cryptophthalmus, in which the margins of the orbit appeared flattened, while the other cranial bones were normal. The eyeballs, which could be felt through the lids, were larger than normal, and were completely covered by the lids. A shallow horizontal furrow was the only indication of a palpebral fissure, and the palpebral cartilages could not be made out.

XI.—CONJUNCTIVA, CORNEA, SCLERA, ANTERIOR CHAMBER.

334. HOOR. The rational treatment of acute ophthalmo-blennorrhœa. *Allgem. Wiener med. Zeitung*, 1893, No. 33.

335. SOBOLKA. A case of blennorrhoic arthritis. *Prager med. Wochenschr.*, 1893, No. 48.

336. CHEVALLEREAU. Epidemic of pseudo-membranous conjunctivitis. *Soc. d'opht. de Paris*, 1893, Oct. 10.

337. SOURDILLE. Clinical, bacteriological, and therapeutic studies on ocular diphtheria. *Arch. d'opht.*, xiii., 12, p. 762.

338. WIDMARK. On the history of trachoma. *Hygiea*, 1893, No. 11, p. 119.

339. BLUBAUGH. The treatment of granular lids. *Jour. Amer. Med. Assoc.*, Oct. 14, 1893.

340. WILLIAMS, CORNELIUS. Pernicious hypertrophic conjunctivitis and its treatment. *Ibid.*, Oct. 28, 1893.

341. BERRY. 1. Conjunctivitis set up by flies. 2. Hyperplastic subconjunctivitis. 3. Intra-ocular therapeutics. 4. Intra-ocular absorption of iodoform. *Trans. Ophth. Soc. Un K.*, xiii., p. 218.

HOOR (334) advises in the initial stage of blennorrhœa, iced applications, and washing with permanganate of potash solution; when there is excessive secretion 2 % silver, in corneal complications atropin and iodoform, and in excessive chemosis peritomy.

SOBOLKA (335) observed in an infant of five weeks, with blennorrhœa from the third day, multiple abscesses and swelling of the joints. Cover-glass specimens of the pus from the abscesses showed streptococci and diplococci, which from their reaction to Gramm's stain he believed to be gonococci. HERRNHEISER.

In six cases, some of membranous croup, the rest of true diphtheria, SOURDILLE (337) found the Löffler bacillus constantly pres-

ent, and with it the staphylococcus albus or aureus, or the streptococcus, the latter being present in the severest cases only. v. MITTELSTÄDT.

BLUBAUGH'S (339) method of treatment is the scraping of the granulations off by means of scrapers of various shapes to fit the localities affected. He has treated more than a hundred cases with good results in this way. BURNETT.

The pernicious hypertrophy of the conjunctiva of which WILLIAMS (340) speaks, he regards as a variety of trachoma, and its danger is to the cornea and particularly to the iris. This latter should always be held in mind and atropine should be used as a routine treatment. Applications of the solid stick of bluestone he considers harmful. Bichloride solutions 1 to 3000 or 5000 he thinks the best for local applications. Expression he deems valuable in some cases, as likewise jequirity. BURNETT.

(1) BERRY (341) records two cases of severe conjunctivitis with corneal ulceration following the stinging of a fly which had apparently risen off a dunghill.

(2) This nomenclature is used to designate cases in which there is solid-like swelling below the conjunctival fold of the lower lid.

(3) Dr. Chassaud tried the result of injecting all kinds of antiseptics into the vitreous humor of rabbits; the only thing which prevented purulent hyalitis was chlorine water; no inflammation or coagulation resulted.

(4) Iodoform was applied to the wound after cataract extraction, and a considerable quantity got into the anterior chamber, but was quite absorbed in a fortnight. WERNER.

342. COUETOUX. Etiological statistics of kerato-conjunctivitis. *Annal. d'Ocul.*, CX., p. 244.

343. KAMOCKI. A case of fatty degeneration of the cornea with intermittent symptoms of irritation. *Graefe's Arch.*, xxxix., 4, p. 209.

344. GRUBER. On deposits of iron rust in the cornea. *Report of XXIII meeting of Heidelberg Ophth. Soc.*, 893, p. 38.

345. HIPPEL, E. On sclerosis bulbi. *Ibid.*, p. 30.

346. FUCHS. On the clearing of corneal scars. *Beiträge z. Augenheilk.*, xi., p. 1.

347. SERGEJEW. A case of bullous keratitis. *Wjestnik Ophth.*, x., 6, p. 505. (Pemphigus of both corneæ in an emaciated dying infant.)

348. MACKAY, G. The optical treatment of conical cornea. *Ophth. Rev.*, xii., p. 317.

349. LYDSTON. Pannus and its treatment by the digestive ferments. *Jour. Amer. Med. Assoc.*, Oct. 7, 1893.

350. WILDER, W. H. Dendritic keratitis. *Ibid.*, Oct. 21, 1893.

In nearly half of his cases of kerato-conjunctivitis COUETOUX (342) finds the classic symptoms of obstruction of the nasopharynx with adenoid vegetations. The maximum of adenoids is found between the ages of two and four, of kerato-conjunctivitis between four and fifteen. SULZER.

KAMOCKI (343) saw peculiar spots in the cornea of a woman of forty-one. Microscopic examination showed them to be composed of corneal cells that had undergone fatty degeneration.

MACKAY (348) endeavors to estimate by retinoscopy the refraction of the central conical portion of the cornea which corresponds to the interior of the dark circular shadow seen with the mirror. He finds the estimation made easier by using stenopæic apertures of 3 to 5 *mm* diameter placed in front of the patient's eye. The results are in some cases very encouraging, *e. g.*, one patient obtained V=$\frac{6}{12}$ with —13 sph. ⊃ — 6 cyl. ax. horiz. WERNER.

LYDSTON (349) reports most successful results in the treatment of pannus from the local application of equal parts of the new digestive ferment papoid and boric acid dusted in the eye twice a day. BURNETT.

WILDER (350) reports three cases of dendritic keratitis one at least of which had a malarial origin. The courses of the others were obscure. BURNETT.

351. KOSTENICH. A case of scleritis. Pathological examination. *Arch f. Augenh.*, xxviii., p. 27 (to be translated).

352. FROMAGET. Syphilitic gummous episcleritis. *Ann. d'Ocul.*, cx., p. 265.

The affection described as gumma of the bulbar conjunctiva takes its origin in the episcleral connective tissue, wherefore FROMAGET (352) proposes the more proper term gummous episcleritis. That which on the lids is described as gumma of the conjunctiva, proceeds from the tarsus, and should be called gumma of the tarsus. SULZER.

Sections XII.–XXI. Reviewed by DR. SILEX.

XII.—IRIS.

353. BACH. Tubercular infection of the eye. *Arch. f. Augenheilk.*, xxviii., p. 36. (To be translated.)

354. CROSS and COLLINS. Epithelial pearl tumor in the iris following implantation of eyelash in the anterior chamber. *Trans. Ophth. Soc. Un. K.*, xiii., p. 199.

355. FROST. Coloboma of iris and choroid on the temporal side of the eye. *Ibid.*, p. 144.

356. ALT. On croupous or hemorrhagic iritis. *Amer. Journ. of Ophth.*, Oct., 1893.

357. SCHNEIDER. Tumor of the iris. *Jour. Amer. Med. Assoc.*, Nov. 4, 1893.

358. LAWFORD. New growth in ciliary region of left eye. *Trans. Ophthal. Soc. Un. K.*, xiii., p. 92.

359. JULES. Melanotic sarcoma of ciliary region. *Ibid.*, xiii., p. 96.

360. STEPHENSON. Concerning persistent pupillary membrane, and its frequency. *Ibid.*, xiii., p. 139.

CROSS's (354) patient injured the eye with a piece of wire. When seen seven months later, there was traumatic cataract, posterior synechiæ, and a small white nodule was wedged in the angle of the anterior chamber above, from this an eyelash ran vertically down. The removal was unsuccessful, owing to adhesion. A year later the eye became irritable, and a large grayish tumor occupied the anterior chamber. The eye was enucleated, and the microscope revealed a cyst in the iris tissue with opaque white contents, degenerating epithelial cells and fat chiefly The cyst wall was lined by laminated epithelium. A very interesting résumé of recorded cases concludes the paper.

WERNER.

ALT (356) thinks, from the similarity of the exudate to other croupous exudations, that the form of iritis described as spongy or gelatinous should be denominated croupous. He reports three additional cases, one of which was associated with hemorrhage into the anterior chamber and between the lamellæ of the cornea.

BURNETT.

In SCHNEIDER'S (357) case the tumor was attached to the periphery of the iris at its outer lower part, and measured 9 x 5 *mm*,

and was first seen in connection with a hemorrhage into the anterior chamber which came from the tumor. These hemorrhages recurred at intervals, and could be induced by pressure on the tumor. It was removed by forceps, but not as a whole, and much hemorrhage followed the operation. On examination it was found to have the structure of a papilloma. There has been no recurrence, and vision was $\frac{20}{30}$. BURNETT.

In LAWFORD'S (358) case there was a small leuco-sarcoma in the substance of the ciliary muscle; it was not encapsuled. It did not project backwards, but appeared as a pinkish nodule in the angle of the anterior chamber. Patient æt. forty-two.

STEPHENSON (360) found vestiges of pupillary membrane in 1.70 % of cases examined. It seemed to be more frequent in the left eye and in females. Members of a family are often affected. Only one example of capsulo-pupillary membrane was met with. These thread-like remains are inelastic. WERNER.

XIII.—CHOROID.

361. MULES. Separation of the choroid. *Trans. Ophth. Soc. Un. K.*, xiii., p. 65.

MULES (361) records two cases, one idiopathic, which simulated a white sarcoma, for which it was mistaken, the detachment only being discovered after enucleation. The second case was traumatic. In neither was any vascularity visible, owing to probable exudation of lymph. WERNER

XIV.—GLAUCOMA.

362. GOLDZIEHER. A case of glaucoma with congenital absence of iris. *Wiener med. Presse*, 1893, No. 49.

363. SOMYA. On inherited glaucoma. *Zehender's klin. Monatsbl.*, xxxi., p. 390.

364. COLLINS. Congenital defects of the iris and glaucoma. *Trans. Ophth. Soc. Un. K.*, xiii., p. 128.

365. GIFFORD. Posterior sclerotomy as an immediate preliminary to some operations for glaucoma. *Journ. Amer. Med. Assoc*, Oct. 28, 1893.

366. LOVE. The origin of glaucoma and a suggestion as to its early management. *Ibid.*

SOMYA'S (363) observation of inherited glaucoma included a father and three sons. In all there was a larger or smaller ring staphyloma.

COLLINS (364) describes the microscopical appearances in three cases of defect of the iris. In Case I. (irideremia) there was a rudimentary stump of iris adherent at its root to the ligamentum pectinatum, anterior polar cataract, and the uveal pigment at the tip of the iris was folded. The author accepts Manz's theory, viz., that an abnormal adhesion between the cornea, anterior fibro-vascular sheath, and lens capsule takes place in the embryo, and then opposes a mechanical obstruction to the growth of the iris. The polar cataract and adhesion of the iris are evidences of this. In Case II. there was congenital coloboma of the iris and lens outwards, and absolute glaucoma. The unusual position of the coloboma is explained on the same principle by a *partial* adhesion of the cornea, anterior fibro-vascular sheath, and lens capsule. There was a notch in the lens opposite the coloboma, and here the ciliary processes were directed backwards; these conditions are explained by defective development of the suspensory ligament. The stump of the iris in the coloboma was adherent to the ligamentum pectinatum, thus predisposing to glaucoma. Case III. was one of traumatic aniridia, adhesion of lens capsule to cornea; glaucoma. WERNER.

GIFFORD (365) considers that a small incision through the sclera into the anterior part of the vitreous, made immediately before the various operations for glaucoma, lessens the dangers which ordinarily attend such operations. This incision should be made two or three months before the iridectomy.

BURNETT.

LOVE'S (366) paper is a plea for the nervous origin of most cases of glaucoma, and he thinks that the treatment of the early stages should be based on this idea. When the disease is fully developed the ordinary methods of treatment—eserine and iridectomy—are indicated. BURNETT.

XV.—SYMPATHETIC OPHTHALMIA.

367. ROSENMEYER. On "sympathetic" optic nerve atrophy. *Arch. f. Augenh.*, xxviii., p. 71.

368. GILLET DE GRANDMONT. Sympathetic optic neuritis of infectious origin. Recovery. *Soc. d'opht. de Paris*, Dec. 5, 1893.

369. STRAUB. Sympathetic ophthalmia. *Weekblad van het Nederlandsch Tydschrift voor Geneeskunde*, i., p. 199, 1893.

In ROSENMEYER'S (367) case, five weeks after a severe injury of the left eye, there appeared headache, photophobia, and flicker-

ing before the right eye. Vision was $\frac{6}{4}$. Five months later he could count fingers only, and the papilla was pale. No general affection could be made out.

GILLET DE GRANDMONT (368) describes a case of pistol-shot injury of the right eye. Left optic neuritis. Cerebral abscess in the motor region for the upper extremity.

STRAUB (369) believes that hyalitis and choroiditis are not sufficiently distinguished. In hyalitis the microbes develop in the vitreous, in choroiditis in the uveal tract itself. In sympathetic ophthalmia the uvea proper is inflamed, as two cases examined by him show. He is therefore of the opinion that in experimental studies on sympathetic ophthalmia, one should not inoculate the vitreous with bacteria, but the choroid itself. After injections made in this way he saw the inflammatory process extend to the other optic nerve. WESTHOFF.

XVI.—VITREOUS.

370. THOMPSON. Peculiar track and lodgment of a fragment of steel and its removal from the vitreous. *Trans. Ophth. Soc. Un. K.*, xiii., p. 159

371. SNELL. Passage of a leaden pellet through the eyeball with retention of perfect sight. *Ibid.*, p. 162.

In THOMPSON'S (370) case a bit of steel 11 x 2 *mm* was removed from the vitreous with an electro-magnet, with a resulting visual acuteness of $\frac{20}{40}$. WERNER.

In SNELL'S (371) case there was first an intra-ocular hemorrhage, which cleared up, leaving the vision $\frac{6}{6}$. Corresponding to the points of entrance and exit of the pellet were two scars on opposite sides of the fundus. WERNER.

XVII.—LENS.

372. BERNHEIM. On the antisepsis of the conjunctival sac and the effect of the tears on micro-organisms. *Beiträge zur Augenheilk.*, viii., p. 6.

373. HILDEBRAND. Experimental investigations on antisepsis in cataract extraction. *Ibid.*, viii., p. 33.

374. MARTHEN. Experimental investigations on antisepsis in eye operations and on the bacteriology of the conjunctival sac. *Ibid.*, xii., p. 1.

375. BECCARIA. On secondary glaucoma consecutive to luxation of the lens. *Ann. di Ottal.*, xxii., p. 115.

376. SWANZY. On the combined method of cataract extraction. *Trans. Ophth. Soc. Un. K.*, xiii., p. 165.

377. MULES. Pyramidal cataract. *Ibid.*, p. 70.

378. JACKSON. Astigmatism following cataract extraction and other sections of the cornea. *Ophth. Review*, xii., p. 349.

379. DE SCHWEINITZ. Antisepsis in cataract extraction. *Therapeutic Gazette*, Nov. 15, 1893.

380. BETTMANN. Ripening of immature cataracts by direct trituration. *Journ. Amer. Med. Assoc.*, Nov. 4, 1893.

BERNHEIM (372) showed that the use of antiseptics does not sterilize the conjunctiva, but still is of passing benefit in arresting for a time the growth of microbes. The tears also assist in preventing the development of microbes, and the trickling out of the aqueous removes the germs mechanically. Many micro-organisms are found on the lid margins. These are best destroyed with nitrate of silver.

HILDEBRAND (373) has found that the conjunctival sac is not rendered sterile even by the use of 1 : 1000 bichloride solution.

BECCARIA (375) describes an interesting case of luxation of the lens. When the patient holds his head erect, he does not complain of any particular disturbance ; but when he bends the head downward or to the side, glaucomatous symptoms come on and remain until he reassumes the upright position. DANTONE.

SWANZY (376) gives the results of 100 consecutive extractions of uncomplicated senile cataracts. There were 95 good results ($V = \frac{6}{60}$ and more), two partial ($V = \frac{1}{60}$ to $\frac{6}{60}$), and three failures. In the three failures iritis supervened, once after a normal operation, with $V = \frac{6}{36}$, which was reduced to p. l. after capsulotomy and iridotomy. Of the two partial cases one should have returned for capsulotomy, and the other got high tension after capsulotomy. Eighty-one cases obtained V of $\frac{6}{15}$ or more, (11 of these having $V = \frac{6}{6}$). Vitreous presented once, and small losses occurred twice. Hemorrhage from the iris occurred once ; the author believes that blood in the anterior chamber during the operation comes usually from the sclero-corneal limbus. Cortical remains were present in 27 cases, but only 3 times in any significant quantity. Reflex vomiting occurred in two patients. Next follows a description of the antiseptic precautions adopted. Iritis occurred in 6 cases. Striped keratitis is noted 6 times, but occurred much oftener. There was only once prolapse of iris—in a patient who vomited while on the table.

The incision is just in the margin of the clear cornea. The least possible amount of iris is removed; the average width in 48 cases was 3.34 *mm.* Eserine is used before operation. The great advantage of iridectomy is the absence of prolapsus iridis; the iris adjacent to the coloboma does not prolapse because the aqueous has a free exit through the coloboma, and cannot push the iris before it when it flows out. The author does not consider a small upward iridectomy "a mutilation." One step in the operation consists in searching the wound for capsule, which was found 18 times. In 46 cases secondary operations were performed. At the meeting at which the paper was read 19 surgeons were in favor of iridectomy and 4 against. WERNER.

In MULES's (377) case, the eye was removed for staphyloma after ophthalmia neonatorum. Three threads of lymph started from the pyramidal deposit, two being attached to the cornea, and one to the remains of the iris. Traction on the capsule is believed to have produced the cone. WERNER.

JACKSON (378) finds astigmatism in all cases of cataract extraction; more than half measured from 2 to 4 D. Immediately after operation the form of the cornea is unaltered, but it changes in a few days—sometimes in a few hours—soon reaching its maximum; it then generally diminishes but often irregularly. Capsulotomy had no effect on it. In the large majority of cases it diminishes to less than 3 D when fixed, *i. e.* after three or four months. The ophthalmometer shows a flattening of the vertical meridian, and an increase of the horizontal curvature. These are both due, the author thinks, to the intra-ocular pressure bulging the parts about the incision. For correction of the astigmatism he prefers a convex spherical equal to the refraction of the highest meridian on the anterior surface of the glass, the horizontal being corrected by a concave cylinder on the surface towards the eye.

WERNER.

In the disinfection of instruments for cataract extraction, DE SCHWEINITZ (379) prefers boiling in a 2% solution of carbonate of sodium, followed by a transference to a bath of absolute alcohol for twenty minutes. BURNETT.

BETTMANN (380), as the result of a further experience in the ripening of immature cataracts by a direct trituration by means of a special trowel of his own device, concludes among other things that the operation is not dangerous, that it is not demanded in the sclerosing form involving the whole of the lens, that the

maturity of the cataract is induced in about three weeks, and in the subsequent extraction the cortical substance is easily removed.

BURNETT.

XVIII.—RETINA AND FUNCTIONAL DISTURBANCES.

381. BOCH. The anatomical condition found in syphilitic retinitis. *Arch. f. Augenh.*, xxviii., p. 67.

382. WOLF, B. On glioma retinæ. Inaug. Dissert., Berlin, 1893.

383. PRAUN. Striæ retinæ with detachment. *Beiträge zur Augenh.*, xii., p. 105.

384. VAN MOLL. Treatment of detachment of the retina with electrolysis. *Weekbl. van het Nederl. Tydschrift voor Geneeskunde*, i., p. 195, 1894.

385. ARBERTOTTI. The blind of Calloro. *Annuario riguard. l'ann. scol. 1892–93, della U. di Modena.*

386. AYRES, S. C. Some phases of hysterical amblyopia. *Amer. Journ. of Ophth.*, Nov., 1893.

387. STANDISH. Retinitis punctata albescens. *Ophth. Review*, xii., p. 253.

388. MORTON, A. S. Two cases of hereditary congenital night blindness without visible fundus change. *Trans. Ophth. Soc. Un. K.*, xiii., p. 147.

BOCH (381) examined the eyes of a woman whom he had treated six months for recurrent syphilitic retinitis, and found circular foci of inflammation in the adventitia and intima of the larger arteries, and in the smaller arteries a more frequent involvement of the intima. The capillaries showed a circular thickening which at times occluded the lumen. The veins only occasionally showed slight inflammatory changes in the enveloping connective tissue. All this indicates that Jacobson's syphilitic retinitis is a primary disease of the retinal vascular system, and is not a secondary affection following a choroiditis.

From the study of seventeen cases of glioma, WOLF (382) claims that the prognosis is favorable when the operation is undertaken at a time when only the retina is involved. The prognosis is bad when the operation is delayed two months after the first signs of the disease are visible.

PRAUN (383), on the ground of clinical observations, discusses (1) prevascular striæ, (2) perivascular striæ, from inflammation

or sclerosis of the vessel wall, and (3) retrovascular striæ. The latter group may be divided into (*a*) retinitis striata, the striæ being new-formed connective tissue deposited between choroid and retina, or in the latter, and (*b*) striæ retinæ or detachment. In the latter case the striæ are formed either by the disappearance of retinal pigment only, or by the deposit of material between the unchanged retina and choroid. Scleral puncture often acts favorably upon the detachment of the retina, which is at the bottom of the trouble.

When the negative pole is introduced into the eye with a current of ten milliamperes, vesicles are formed and there is a slight inflammatory reaction, with exudation and swelling that last about three days. When the positive pole is introduced fewer vesicles are formed, but the inflammation, hemorrhage, and swelling are more marked and last about eight days. VAN MOLL (384) never saw detachment of the retina cured in this way.

WESTHOFF.

AYRES (386) records the following cases of hysterical amblyopia: 1—concentric contraction of the visual field; 2—sudden blindness of one eye; central scotoma; 3—hysterical amblyopia, sudden disappearance of same while undergoing refraction test; 4—hysterical photophobia. BURNETT.

STANDISH'S (387) patient, a man aged thirty-one, on the first visit complained of slight defect of sight in one eye, but it was only trifling and no ophthalmoscopic change existed; on the second visit six months later, V=$\frac{20}{100}$ with monocular haze; some weeks later V=$\frac{20}{100}$, but there was some infiltration and exudation about the disc, and a few white shining spots at macula; the latter increased in number as the infiltration subsided. There was nothing in the history of any importance except that a year previously he had looked at a very powerful electric arc. WERNER.

MORTON'S (388) patients were an uncle and nephew. They had normal V. with corrected myopia, perfect color vision, normal fundus, small circular fields, and decided night blindness. A chart is given in which fifteen members (all males) of the family were affected. No female member was ever known to have been affected. WERNER.

XIX.—OPTIC NERVE.

389. SCHEIDEMANN. Injury of the eye by gunshot wounds of the temple. *Centralbl. f. prakt. Augenheilk.*, xvii., p. 353.

390. HERMANN. Choked disc after extraction of a tooth. *Ibid.*, p. 366.

391. ADAMKIEWICZ. On choked disc. *Neurol. Centralbl.*, 1893, p. 802.

392. PERLES. On the disappearance of choked disc. *Centralbl. f. prakt. Augenh.*, xvii., p. 230.

393. BOURGEOIS. Mixed tumor of optic nerve and orbit. *Soc. d'opht. de Paris*, Sept. 10, 1893.

394. SOLYMANN. Studies on myxosarcoma of the optic nerve. *Graefe's Arch.*, xxxix., 4, p. 94.

395. BRAUNSCHWEIG. The primary tumors of the optic nerve. *Ibid.*, p. 1.

396. PAPAW. A contribution to the knowledge of optic-nerve changes in tabes. *Deutsche Zeitschr. f. Nervenheilk.*, iv., p. 270.

397. BOURGON. On the employment of injections of the organic extracts of Brown-Séquard and Arsonval in the treatment of different forms of atrophy of the optic nerve. *An. d'Ocul.*, cx., p. 349.

398. DE WECKER. Injections of Brown-Séquard extracts in ocular therapy. *Ibid.*, p. 346.

399. ROCKLIFFE. Notes on a case of tumor of the optic nerve. *Trans. Ophth. Soc. Un. K.*, xiii., p. 101.

400. TAYLOR. A case of probable rupture of the optic nerve. *Ibid.*, p. 155.

401. SCONGALL. A case of double optic atrophy following erysipelas of one side of the face. *Ibid.*, p. 82.

After shot-injury of the temple, SCHEIDEMANN (389) observed (1) rupture of the optic nerve with immediate blindness, (2) internal hemorrhage and tearing of the inner coats with varying disturbances of vision, (3) ocular-muscle paralysis, isolated or associated with the disturbances mentioned.

Twenty-four hours after extraction of a tooth, HERMANN (390) found choked disc with blindness. The cause was supposed to be a hemorrhage on the base of the cranium. The disc became pale later and vision was R. $\frac{1}{3}$, L. $\frac{2}{3}$.

ADAMKIEWCZ (391), experimenting in regard to the production of choked disc, came to the following conclusions: 1. The introduction of any indifferent substance compressing the cranial contents does not cause any change in the circulation of the

fundus. 2. This result is the same when substances such as laminaria are introduced, which swell and cause gradually increasing pressure. 3. If a colored fluid is forced, under high pressure, into the skull of an animal, the choroidal veins appear dilated, but the retinal veins are not over-filled. 4. Setting up an artificial encephalitis or removing various portions of the brain does not cause choked disc. Choked disc, in the author's opinion, cannot be due to mechanical causes.

PERLES (392) reports six cases of choked disc which, from the nervous symptoms present, could only have been due to gummous new formations in the cranial cavity. In all, the vision and field of vision were normal. Under mixed treatment the discs regained their normal appearance. These good results are obtained when the cause of the choked disc is removed before the acuteness of vision or the visual field has suffered. In these cases there is probably a serous infiltration only, for a true acute infectious or toxic neuritis, an actual inflammatory affection of the nerve, must always leave more or less marked change in the disc.

BRAUNSCHWEIG (395) reports four cases of true optic-nerve tumors, developing within the nerve sheath, and reviews the literature of the subject. The diagnostic signs of these tumors, that occur chiefly in younger individuals, are: (1) slow, painless course without inflammatory symptoms; (2) early decay of vision; (3) relatively good mobility of the ball; (4) a palpable tumor within the muscle funnel, uniting eyeball and optic foramen. The prognosis is good, and removal with preservation of the ball should be attempted. Krönlein's temporary osteoplastic resection of the outer orbital wall may be advisable. The usual type is myxosarcoma.

PAPAW (396) found in one case, which is not the rule, that a tabic affection of the optic nerve began peripherally and gradually extended centrally. The direct bundles were particularly affected.

DE BOURGON (397) gives in detail the clinical histories of four cases, the first a white cerebral nerve atrophy, the second a gray atrophy, the third an atrophy following brain tumor, and the fourth a white atrophy in a diabetic patient, all treated for a considerable time with Brown-Séquard testicular fluid without the slightest effect. SULZER.

DE WECKER (398) finds that injections of testicular fluid are as futile in arresting the progress of gray atrophy as the em-

ployment of all other remedies. A favorable effect on the general health and on the spirits of the patient is undeniable.

ROCKLIFFE'S (399) patient, a man æt. twenty, suffered from slowly increasing proptosis, with perfect movement and no displacement laterally; there was some loss of vision, no pain or constitutional derangement, some dilatation of retinal veins which did not pulsate. The tumor was inside the pial sheath of the optic nerve and resembled a glioma. An interesting summary of the literature concludes the paper. WERNER.

TAYLOR'S (400) patient struck the lower eyelid against a piece of wood, very violently, and immediately lost the sight. There was a slight scar on the lower lid when seen; no injury to the globe. There was slight retinitis with hemorrhage above the disc, and no perception of light. Later the disc became pale. WERNER.

XX.—INJURIES, FOREIGN BODIES, PARASITES.

402. DRANSART. Contusion of the eye. *Jour. d'Ocul. du Nord.*, Feb., 1893.

403. BAQUIS. A rare case of subperiosteal orbital hematoma from an incomplete simple linear fracture. *Arch. di Ottalm.*, i., p. 162.

404. CAPEI. Clinical notes of two cases of severe traumatism of the eye successfully treated. *Boll. d'Ocul.*, xv., 16.

405. MEESMANN. On foreign bodies in the fundus. *Inaug. Dissert.*, Berlin, 1893.

406. SANDFORD. Foreign body in the globe for five years; removal. *Trans. Ophth. Soc. Un. K.*, xiii., p. 151.

BAQUIS (403) describes a hematoma of the orbit following trauma, which produced considerable displacement of the eyeball. Since there were ecchymoses in the lids, but not beneath the conjunctiva, and since the ball preserved its mobility, the author concluded that the hemorrhage was subperiosteal. The case recovered completely after puncture. DANTONE.

In one of CAPEI'S (404) cases there was a splinter of iron in the iris which caused irritation only some weeks after its entrance. It was successfully removed. In the second case there was a penetrating wound of the sclero-corneal junction, with prolapse of vitreous, produced by a splinter of glass. The eye recovered without complication. DANTONE.

In SANDFORD'S (406) case a portion of a rusty needle was lying

with one end in the cornea and the other in the lens. Removal of the needle and lens resulted in V. of ⅓. WERNER.

XXI.—OCULAR DISTURBANCES IN GENERAL AFFECTIONS.

407. CAPEI. On syphilitic manifestations in the eye. *Boll. d'Ocul.*, xv., p. 22.

408. BAQUIS. Gummous iritis in the second stage of syphilis. *Ann. di Ottalm.*, xxii., 2–3, p. 121.

409. MOSING. A case of isolated tumor of the corpora quadrigemina. *Petersburger med. Wochenschr.*, No. 42, 1893.

410. JOCQS. Paralysis of the sixth pair from fracture of the base of the cranium. *Soc. d'opht. de Paris*, May 5, 1893.

411. FROMAGET. Transitory motor hemiplegias with persistent visual disturbances. *Gaz. hebdom. des sciences méd. de Bordeaux*, 1893, p. 190.

412. WERNICKE. Brachial hemiplegia with hemianopsia due to puncture of the crus cerebri. *Allg. Wien. med. Zeitung*, No. 48 and 49, 1893.

413. SCHAFFER. Retinal reflexes during hypnosis. *Neurol. Centralbl.*, 1893, p. 809.

414. HETZEL. A contribution to the pathological anatomy of Basedow's disease. *Deutsche Zeitschr. f. Nervenheilk.*, iv., p. 353.

415. PHILIPSON. Histological description of a leprous eye. *Beiträge zur Augenheilk.*, xi., 1893.

416. CROSS. Four cases of retinitis after influenza. *Trans. Ophth. Soc. Un. K.*, xiii., p. 79.

417. HARTRIDGE. A case of double optic neuritis after influenza. *Ibid.*, p. 77.

418. WHITE, J. A. Optic-nerve troubles accompanying or following fevers, especially typhoid fever. *Journ. Amer. Med. Assoc.*, Oct. 28, 1893.

419. MORROW, E. P. Two cases of brain tumor where optic neuritis was the only positive sign. Autopsies. *Ibid.*, Oct. 21, 1893.

420. SCHAPRINGER. Retropharyngeal abscess in an infant with consecutive paralysis of the ocular twigs of the sympathetic of one side. *Amer. Journ. of Ophth.*, Oct., 1893.

421. FRIEDENWALD. Paralysis of both external recti muscles after diphtheria. *Med. News*, Oct. 21, 1893.

422. SNELL. Two cases of blindness, resulting from erysipelas. *Trans. Ophth. Soc. Un. K.*, xiii., p. 87.

In the two cases of specific iritis described by CAPEI (407), inflammatory products were found at the peripheric margin of the iris. In one case there was a purulent infiltration that sank to the bottom of the anterior chamber and caused glaucoma. In the other case a condyloma appeared at the margin of the iris before the secondary eruption developed. Both cases recovered under mixed treatment. DANTONE.

BAQUIS (408) observed four tumors in an advanced case of iritis. Two were located on the outer and inner ciliary margin of the surface of the iris, the two others opposite the first on the scleral margin beneath the conjunctiva. The successful result of mixed treatment showed them to be gummata.

DANTONE.

In his first case FROMAGET (411) saw a persistent left hemianopsia, crossed amblyopia, and almost complete achromatopsia, after a transitory left motor hemiplegia. In his second case right lateral hemianopsia and crossed amblyopia persisted after a transitory right hemiplegia. This symptom complex is rare and its localization difficult. The simultaneous apoplectic attack, motor hemiplegia, and disturbance of vision indicate that all the symptoms were due to a single lesion which must have been in the cortex, the peduncle, or the internal capsule. There is, therefore, a focal affection of the brain that, besides a transitory motor hemiplegia, causes characteristic ocular symptoms, viz., a lateral hemianopsia of the eye of the paralyzed side, a crossed amblyopia, and disturbances of color perception.

In WERNICKE'S (412) case, on account of the hemianopsic pupillary reaction, the hemianopsia was located in the left optic tract. Thus a local diagnosis for the monoplegia brachialis could be made, for the lesion must have been in the peduncle of the side affected, where the tract rests on it. The position of the wound supported the clinical diagnosis.

SCHAFFER (413) examined hypnotized individuals by means of the perimeter, and found that a bilateral contracture of the body disappeared when the test object covered the yellow spot of either eye. A right hemicontracture appeared with irritation of the nasal half of the right retina or the temporal half of the left. A left hemicontracture appeared with irritation of the temporal half of the right retina or the nasal half of the left.

In the cases of Basedow's disease HETZEL (414) found in the swellings in the neck : (1.) an infiltration of the walls of the smaller vessels with secondary narrowing of the lumen ; (2.) small hemorrhages ; (3.) proliferation of nuclei in the connective-tissue capsules of the ganglion cells ; (4.) increase in interstitial connective tissue at various points ; (5.) degenerative changes in a number of ganglion cells, which showed various degrees of atrophy.

In PHILIPSON'S (415) case, yellow leprous infiltrations showed through the brown skin of the eyelids, and there were leprous changes in both corneæ and in both limbi. The tissue was composed of round cells and large cells poor in protoplasm. The protoplasm is reduced by vacuole formations to a very fine network with meshes the size of a red blood corpuscle. They have one or more large nuclei. These are Virchow's lepra cells. The leprous new formations took place particularly in the vessels. The lens was not affected. The bacilli lay in the lepra cells, mostly in the vacuoles, and also in the endothelium of the blood-vessels and at some points within the lumen of the vessel between the white corpuscles. He was able to show that the pigmented lepra cells developed from pigmented connective-tissue cells, as well as from the pigment cells.

In all these (416) there was severe pain in the head ; one presented white spots at the macula ; atrophy of the optic nerve followed in the others. WERNER.

In this case (417) there were white spots at the macula without any stellate arrangement. WERNER.

WHITE (418) reports : (1) a case of optic neuritis after typhoid fever, that recovered ; (2) a case of atrophy after typhoid fever that was steadily improving under treatment ; (3) a case of total blindness after malarial fever which recovered perfect vision. BURNETT.

In MORROW'S (419) cases, which are reported with great fulness, there were no other evidences of the intracranial lesion than the papillitis. In one case the tumor was found lying at the base of the middle lobe of the cerebrum on the right side. It was two inches long and an inch in diameter. In the second case it was on the upper surface of the cerebellum, 2 inches long and ½ inch thick. It was a glioma ; there was no excess of fluid in the arachnoid space. BURNETT.

In SCHAPRINGER'S (420) case, an infant of nine months showed miosis of the right eye, and the palpebral fissure of that side was

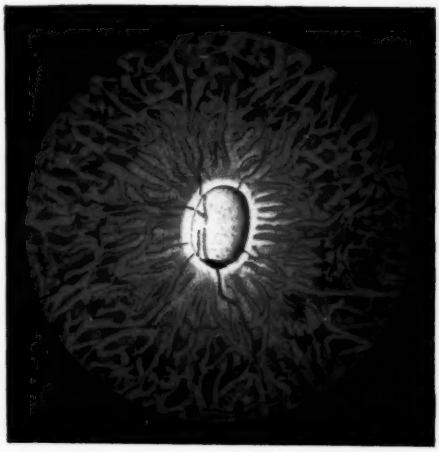
only half so large as the other. There was no enophthalmus. Both pupils responded to light. The only discoverable cause was a retro-pharyngeal abscess that developed three months before and had been repeatedly incised through the mouth.

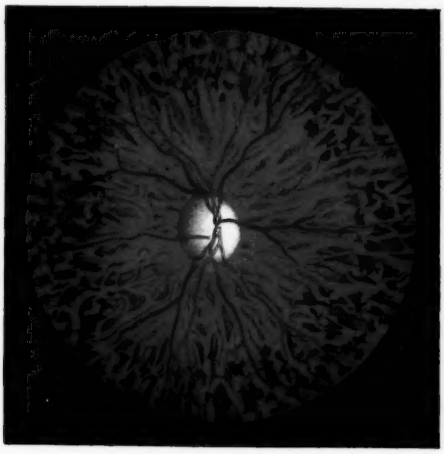
BURNETT.

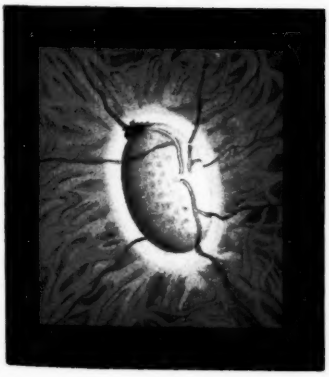
In FRIEDENWALD'S (421) case paralysis of both external recti came on three weeks after a severe attack of diphtheria, and disappeared in sixteen days.

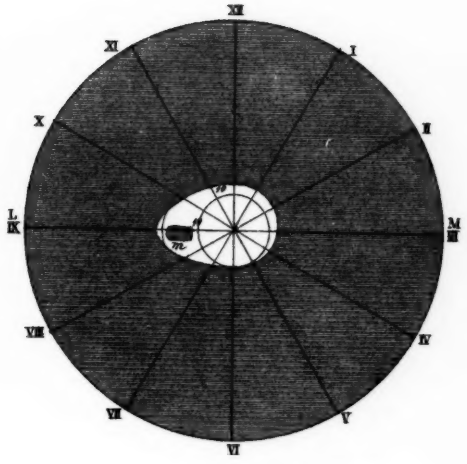
In SNELL'S (422) cases there was orbital phlegmon. In one case there were hemorrhages in the retina and vitreous.

WERNER.









m Mariote's blinder Fleck.
COS Camp. oc. sinistri.
L laterale, *M* mediale Seite.

AD NATURAM PINX. N. CULBIN. VERLAG VON J. F. BERGMANN, WIESBADEN.

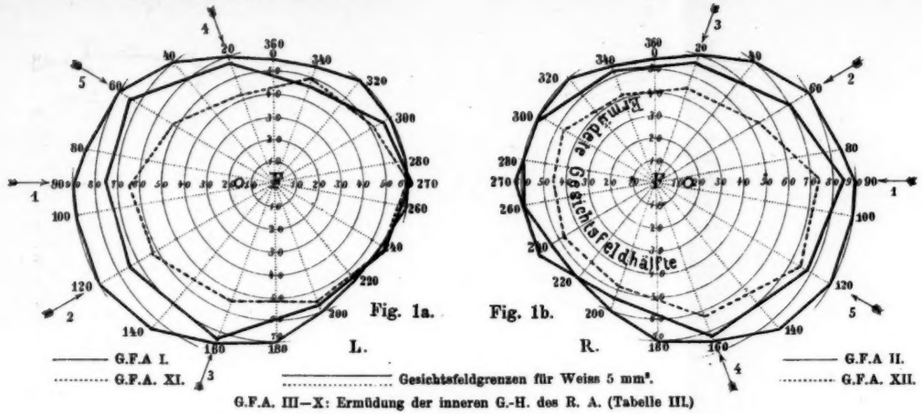


Fig. 1a. Fig. 1b.

G.F.A. I. G.F.A. II.
G.F.A. XI. G.F.A. XII.
Gesichtsfeldgrenzen für Weiss 5 mm².

G.F.A. III—X: Ermüdung der inneren G.-H. des R. A. (Tabelle III.)

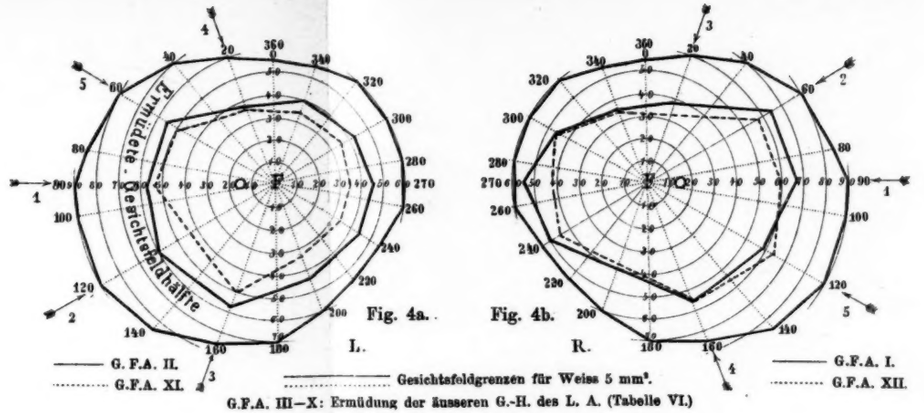


Fig. 4a. Fig. 4b.

G. F. A. II. G.F.A. I.
G.F.A. XI. G.F.A. XII.
Gesichtsfeldgrenzen für Weiss 5 mm².

G.F.A. III—X: Ermüdung der äusseren G.-H. des L. A. (Tabelle VI.)

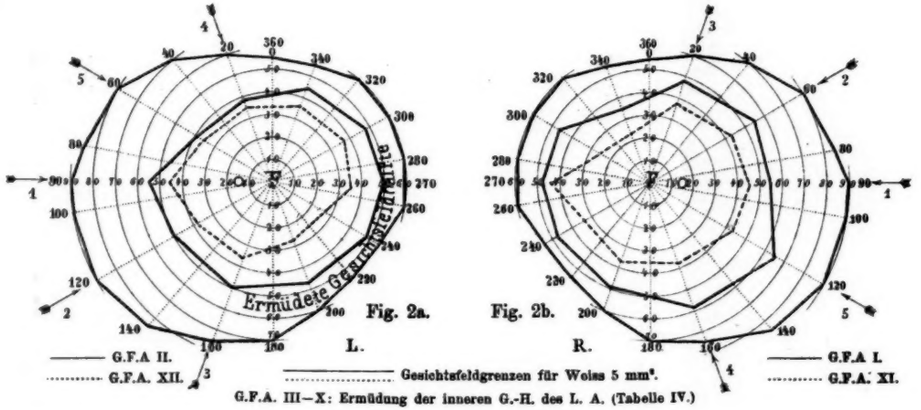


Fig. 2a. Fig. 2b.

G.F.A. II. G.F.A. I.
G.F.A. XII. G.F.A. XI.
Gesichtsfeldgrenzen für Weiss 5 mm².

G.F.A. III—X: Ermüdung der inneren G.-H. des L. A. (Tabelle IV.)

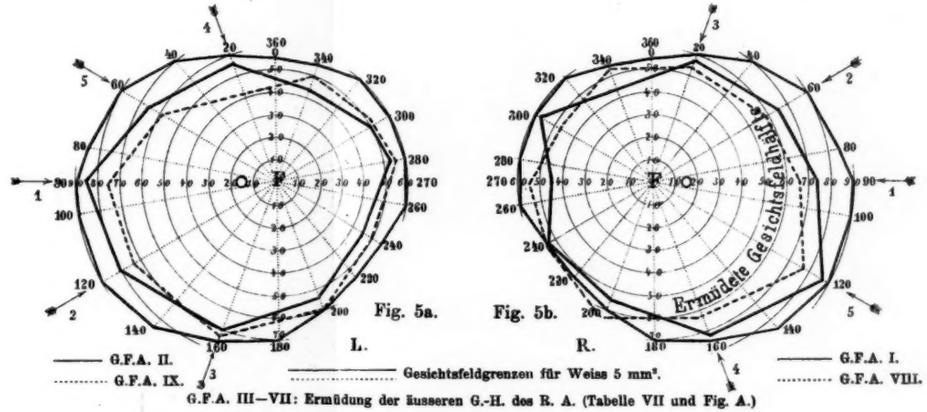


Fig. 5a. Fig. 5b.

G.F.A. II. G.F.A. I.
G.F.A. IX. G.F.A. VIII.
Gesichtsfeldgrenzen für Weiss 5 mm².

G.F.A. III—VII: Ermüdung der äusseren G.-H. des R. A. (Tabelle VII und Fig. A.)

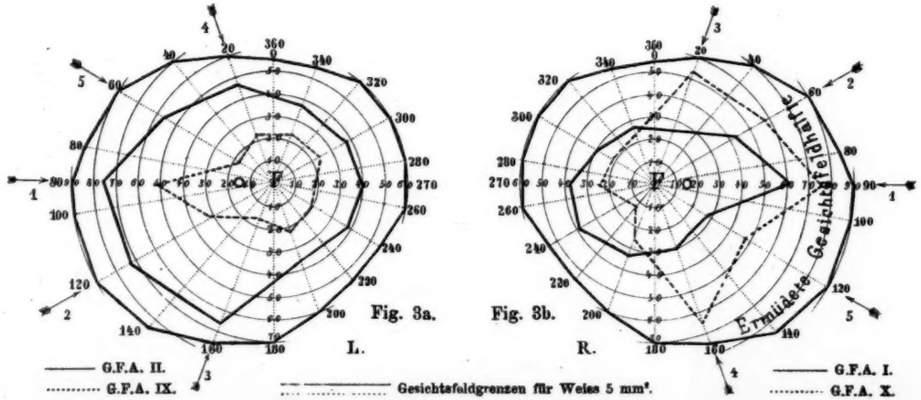


Fig. 3a. Fig. 3b.

G.F.A. II. G.F.A. I.
G.F.A. IX. G.F.A. X.
Gesichtsfeldgrenzen für Weiss 5 mm².

G.F.A. III—VII: Ermüdung der äusseren G.-H. des R. A.

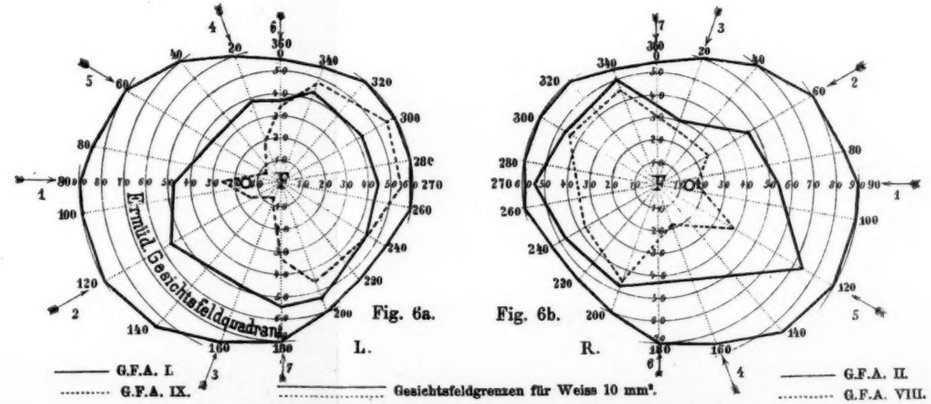


Fig. 6a. Fig. 6b.

G.F.A. I. G.F.A. II.
G.F.A. IX. G.F.A. VIII.
Gesichtsfeldgrenzen für Weiss 10 mm².

G.F.A. III—VII: Ermüdung des unteren äusseren Gesichtsfeldquadranten des L. A.

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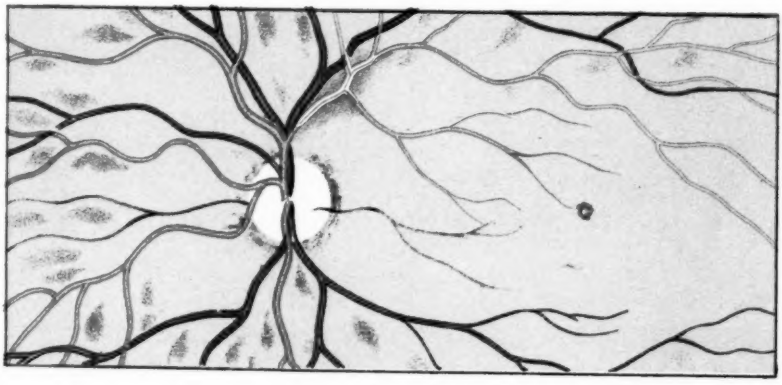

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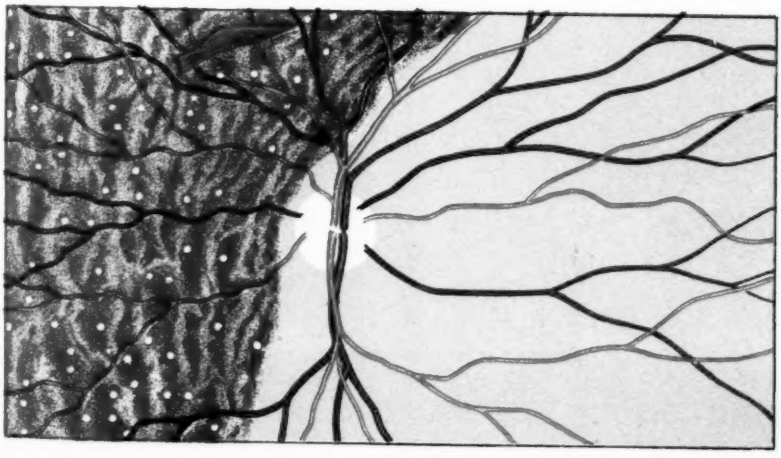

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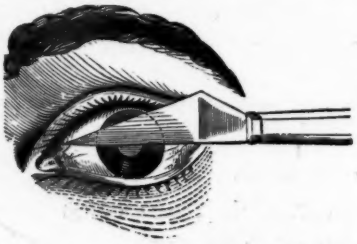

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Under the heading of "Miscellaneous Notes," there will be published all kinds of professional news which specially concern the oculist, *e. g.*, appointments, honors, resignations, vacancies, new ophthalmic hospitals, opportunities for instruction, prize questions and essays, announcement of Society meetings, etc. Brief notices of this kind will be thankfully received by the editors.

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